BRITISH CARPENTRY

GOTHIC ROOFS.

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BRIEF CHAPTERS

ON

BRITISH CARPENTRY:

HISTORY AND PRINCIPLES

OF

Gothic Roofs.

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AUTHOR OF "A HOUSE FOR THE SUBURBS," "PERSPECTIVE OR GRAPHIC PROJECTION," AND OTHER WORKS.

"Their principles of construction bear a nearer analogy to masonry than to modern carpentry. A high roof is in perfect unison with the aspiring and pyramidal character of Gothic Architecture. Of timber roofs we have no example in Grecian buildings, but the beautiful stone roof of the octagon tower of Andronicus Cyrrhestes and that of the choragic monument of Lysicrates are sufficient to show that they were more inclined to ornament than to hide this essential part of a building."—TREDGOLD.

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WOODCUTS.

BRIEF CHAPTERS

ON BRITISH CARPENTRY.

CHAPTER I.

INTRODUCTORY.

THE artistic incidents of carpentry attract the architect's feeling as strongly as the scientific and practical relations engage his graver contemplation; but their annals have received scarcely any consideration whatever. It will be here attempted to sketch the more prominent elements with some regard to historic order, from a time when the carpenter began to encroach on the mason, to the present, at which he, in turn, is yielding to the worker in iron.

Few have subjected English antiquities to more diligent investigation than the late Mr. John Britton; and he notices that "the gradual progress of the art of building with timber is a subject of which a judicious account is a desideratum."* Abraham Swan's book, which appeared in 1759, shows but a confused condition of mind, as though he were

* Dictionary of Architecture.

halting between two opinions, for the old system had been in great part relinquished, but new principles were imperfectly understood. Smith's "Specimens of Ancient Carpentry," engraved and published by Seago, in 1787, are unaccompanied by any letterpress whatever. Such authors as Nicholson, and Tredgold, developed special branches, but with practical aims rather than literary or artistic views.

Something has indeed been done since Britton penned his remarks; Messrs. Brandon and others have rendered good service; but the want he indicated has not been fully removed. Mr. G. E. Street, A.R.A., has directed his great talents to the English wood-work of the thirteenth and fourteenth centuries;* and this circumstance imposed some slight restrictions on the scope of a subsequent essay of my own, though I had by a sessional paper of much earlier date drawn attention to some peculiarities and examples. The restriction in this place consequently is rather nominal than real; but I derive pleasure from this recognition of Mr. Street's labours, and advantage from the information they afford.

Such an account as Britton conceived is not easy of accomplishment, but may probably be best supplied by gathering into a connected review the intelligent observations of many minds made in separate fields, and exercised on scattered examples, so that we may look for the best narrator in the

* Transactions of the Institute, 1865.

most assiduous collector; but successfully dealt with, the subject is undoubtedly calculated to interest not only those vocationally concerned, but a large exterior class. Under this impression I have contemplated some such contribution as the present to a compilation of the kind, and the purpose has been accelerated by facilities for which I am indebted to the Editor of THE BUILDING NEWS. My drawings have been reduced and engraved by the artists of that journal. Without graphic accompaniments the clearest descriptions are flat and unintelligible. The lectures of our best architects delight in delivery by the emphasis of conviction, and support of visible demonstrations; but into what spiritless narratives do they degenerate when the aid of illustration is withdrawn !

I have spoken of mason and carpenter as in a sort of opposition, but their respective pretensions may be considered ; and the mason is entitled to precedence.

Among the primæval antiquities of this country, Stonehenge bears testimony that the practice of working in stone existed here in days far beyond the reach of history. Professor Nielson attributes it to a race of pre-Druidic fire-worshippers—Phœnician colonists settled here, and assigns it to the rites of Baal. The pillars and imposts yet remaining are but the weather-beaten remains of a circular temple, once possibly resplendent with elaborate figures and diversified accessories of art.

English masonry during the influence of the Romans displayed an elegance of design and per-

fection of workmanship suitable to that polished people; while in later times it achieved the vaultings of the Royal chapels at Cambridge, Westminster, and Windsor.

But the conversion of stone is always costly, and in a country so well wooded as England, early builders were presented by Nature with a material of more easy and universal application. It is not surprising, therefore, that among our Anglo-Saxon ancestors wooden edifices should have obtained so completely that "to build" and "to timber" were equivalent terms.* In character they may not have been superior to the prevailing rudeness of the age; but their adoption was universal. That edifices constructed by Saxon and Norman builders, of wood, and covered with thatch or shingles, should have generally perished in a lapse of several centuries, with all the casualties of warfare, fire, neglect, and change of purpose or of taste, is less surprising than the actual existence of some few examples. But these sufficiently show that tenacity and duration were united in the material with lightness and facility of use.

* Gwilt's Saxon Grammar.

CHAPTER II.

GABLE ROOFS IN STONE.

WHATEVER the substance adopted for enclosures and divisions may have been, a good covering for protection against the weather was always necessary. In dry and sultry regions the flat heavily-formed terrace would be most agreeable; but in this country, where abundant rains are more to be provided against than excessive heat, the convenience and economy of timber could not fail to secure its general employment, while our instances of outer stone roofs, as at Willingham and Barneck, though perhaps more frequent in Ireland, are altogether minor and exceptional.

The covering of large apartments tried to the uttermost the structural resources of remoter mediæval times; stone and wood were made available in turn, according to aptitude or local production; masons and carpenters were kept in active emulation.

Where the space to be covered with timber exceeded the compass of a single beam, it was usually divided into three parts, that in the middle being approximately double the width of either of those at the sides. The same arrangement took place where masonry was used, if the span were thought too great for a single arch. All such works, therefore, were closely assimilated in plan to the nave and aisles of a church. It is probable, indeed, that Continental churches formed the models for our

early imitation. In English examples of Norman date, arches of masonry crossing the aisles at the back of the piers remain in several buildings, as at Hartlepool Church, an interior finely engraved in "Billings' Antiquities of Durham."

HARTLEPOOL CHURCH.

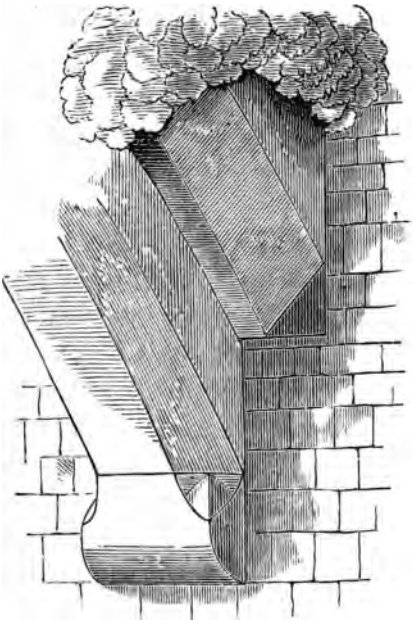
The highly characteristic Norman church of S. Peter, at Northampton, has such arches, and from the occurrence of shafts running upwards on

the navè wall, it may be supposed that cross arches and gables were also intended there. If this surmise be correct, the accordance of design and arrangement, though not of detail, between this church and that of San Mineato, at Florence, could hardly be more striking and complete. San Zenone, at Verona, illustrated in the beautiful work of Mr. Gally Knight, by my late friend Mr. George Moore, and the French cathedral at Le Pûy, admirably represented by Mr. Street in the "Institute's Transactions, 1860-61," may be also noticed as examples of this form, and the last is further remarkable for the squinches or pendentives, that savour strongly of a Moresque source. This latter edifice is assigned to A.D. 950 to 1000.

The refectories or frateries, in which the inmates of great monastic houses assembled for meals, were necessarily spacious. In a manuscript account of that at Hereford, by the late Mr. John Clayton, it appears to have been 110 ft. by 55 ft. It was divided into centre and side parts by ranges of wooden pillars and arches. Considerable portions of the Norman timber-work remain mixed up with and enclosing some principal rooms of the Episcopal palace. But whether in religious or lay possession, these capacious apartments afforded the best opportunities for skilful roofing.

The large Gothic roofs are attributed by Kraft to the pride of the feudal times, and perhaps some measure of ostentation attends the uprearing of every colossal edifice, religious, military, or civil. The cathedral, majestic in form, intricate in design,

mysterious in effect,—the castellated stronghold of the noble, the hall of the municipal guild, the seat of some commercial corporation, the mansion of the man of affluence, may all owe to a sense of exultation in their projectors a character beyond the strict proportion of means and ends. The same feeling has actuated monarchs and churchmen, Plantagenets and Wykehams, Parliamentary committees, boards of directors, and individual votaries of ambition.



SPRINGING OF GABLE, CONWAY CASTLE.

But whatever the cause to which our palatial halls are due, the skill evinced in their construction is even more astonishing than their extent; and it would be a task of interest to follow a development so strictly in agreement with the circumstances of the times. So long as security depended on the command of armed retainers, and the baron met his vassals and serfs at a common table, the great hall was well adapted to its purpose; but as commercial influence arose, and the establishment of

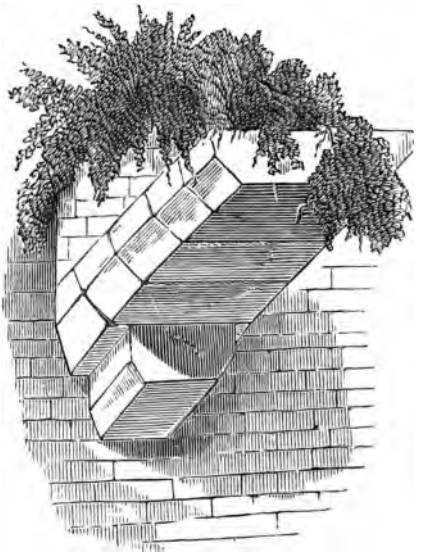
REMAINS OF T

HE HALL AT CONWAY CASTLE.

(To follow page 8.)

personal freedom imposed individual responsibilities and induced assiduity, the sentiment of loyalty inspired the entire nation. Thenceforward the military character of the baronial household subsided, the refinement of manners brought a variety of apartments into request, and the chief feature of the ancient mansion disappeared. My purpose, however, is to indicate their rise rather than to chronicle their fall.

The first Edward repeating in Wales the war policy of William in England, secured his conquest by the erection of stately and impregnable castles—an operation for which his crusading observations and experiences especially qualified him. That at Conway he built in 1284. "A more beautiful fortress," says Pennant, "never arose. Its form is oblong, placed in all parts on the verge of the precipitous rock. One side is bounded by the river, another by a creek full of water at every tide, and most beautifully shaded by hanging woods. The



SPRINGING OF GABLE, CONWAY CASTLE.

other two sides face the town. Within are two courts, and on the outside project eight vast towers, each with a slender one of amazing elegance issuing from its top, within which had been a winding staircase. The great hall suited the magnificence of the founder. It extended 130 ft. in length, was 32 ft. broad, and of a fine height. The roof was supported by eight noble arches, six of which still remain." These arches carried gables in the manner already described, and they serve to elucidate an old term, not always intelligibly defined, the "gabled roof." The illustration, after Cotman, shows the picturesque condition of the ruins, but on personal examination I found the springings of the arches more in the form of the marginal sketches.

The Mote house, situated about two miles from Ightham and four from Sevenoaks, is an edifice respecting which the professed topographers, Hasted, Moule, and Lewis, are remarkably incommunicative, but guided by Mr. J. Russell Smith's "Bibliotheca Cantiana," I have met with some interesting particulars in the "Gentleman's Magazine," 1835 and 1837. The writer, Mr. A. J. Kempe, derives the name of the parish from iꝫað, the Saxon for island, in reference to the position of this, the principal building within it. It was, indeed, a romantically situated fortalice, concealed by woodlands, in a deep ravine; and the waters of a rivulet flowing round the enclosure supplied the moat from which the name is taken.

The annexed letter from Mr. A. Hall to the

HALL ROOF

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Editor of the *Building News*, and my reply relate to this etymology.

SIR,—Permit me to remark that Ightham is too large to be correctly defined as an Island, merely from the circumstance of the Mote House having been surrounded with water, as was frequently the case of old, like the residence of that sad lady, who so persistently asserted that she was 'a weary, she would that she were dead.

Ightham, in Kent, is said to have derived its name from a union of *eight ham*lets into one township. It was once a market town, and I find enumerated Borough-green, Oldbury, Redwell, and Toyhatch, as well as the Mote-house, forming five only out of the eight hams which it boasted of old.

I am, &c. A. HALL.

SIR,—With reference to Mr. Hall's note to you in support of the derivation from a cluster of eight hamlets, the incident of the Oxford and Cambridge boat race enabled me to make a little inquiry. *Chiswick Eyot* was frequently mentioned in the newspapers, and I found it was pronounced Chiswick *Ait*. In Todd's "Johnson" eyot means a little island, and was so used by Blackstone. "It seems just that the eyots or little islands arising in any part of the river shall be the property of him who owneth the piscary and the soil." As to *eight* (Saxon *iggath*, an island) the same dictionary makes it "an island in a river." "Some also do plant osiers on their eights like quicksets."—Evelyn. The situation of the Kentish Mote House (with the waters of a rivulet flowing round the enclosure and supplying the moat) would therefore appear to justify the appellation either of Ightham or Eightham.

THOS. MORRIS.

There is no record of any great military adventure here, but the site was occupied at an early period of the Anglo-Saxon dynasty. Ivo de Haut had it in the time of Henry III., and it was long held by owners of that name. To this reign the original parts may be referred, and they are probably the work of Sir Piers Fitz Haut. The place alto-

gether is a good specimen of the fortified house of a knight of the fourteenth century.

Passing under the gate, we enter the court, in front of which is the object we are in search of—on account of its gabled roof—the hall. The interior furnishes one of the animated scenes in Nash's "Views of English Mansions," but instead of the mere arched rib of stone there represented, Mr. Railton (to whose pencil I am frequently indebted) found the arch and gable solid up to the cross-string, as now engraved. The roof of the hall, says Mr. Kempe, "has undergone some alterations, but at either end two of the acutely Pointed arches remain." The alterations here referred to (including the introduction of a large window), are assigned to Richard Haut, in Henry VII.'s reign. The method of supporting the middle of the rafters is not shown, but may be judged of from other instances that will be introduced.

Perhaps the finest example of gable roofing was at the Archiepiscopal Palace of Mayfield, Sussex, once the home of S. Dunstan, and where his reputed tongs, hammer, and anvil were long preserved. Mayfield was attached to the See of Canterbury till the time of Henry VIII., and was then relinquished to the Crown by Archbishop Cranmer. The King granted it to Sir Edmund Worth, and from him it passed into the occupation of Sir Thomas Gresham. It was dismantled about A.D. 1730. The Hall was 68 ft. long, and 38 ft. broad. "The lofty stone arches which supported the roof are left standing, not," says Nichols ("Bib. Topog. Brit."), "with any intention of showing to

posterity its ancient grandeur, but because the materials were judged inadequate to the expense and danger of taking them down." They give to the ruins, he adds, "a most venerable and picturesque appearance."

The erection of this hall seems attributable to Archbishop Islip, 1349-66, who is acredited with munificence and architectural taste. Besides his works at this favourite residence, he expended large sums on the palace at Canterbury, on the house at Maidstone, and in founding Canterbury Hall, Oxford, now part of Christ Church, and remembered in Canterbury Quadrangle. Dean Hook found but scanty records of his private life, but he is supposed to have been of noble stature, and an active public-minded man, taking a due share in the important events of his time. He was, however, an invalid for several of his latter years. Travelling (of course on horseback)* towards Mayfield in January, 1362, he was thrown in a watery place and thoroughly drenched; but continuing his journey and neglecting even on arriving at the Palace to change his raiment, he fell asleep (*in quadam lapidea camera*), and after dinner had a stroke of palsy.

A great proportion of the edifice no doubt

* Thirty-two years later (1394) there are items in the Household Roll of William of Wykeham, "Two new chariot wheels bought for my lord's chariot, 5*s* 4*d*. Expended in binding the same with iron tires 3*s* 7*d*. Twelve chariot horses for my lord, price £26."—Ingram's Oxford: art. New Coll.

continued of timber, and the stone room was probably the one just considered. Buildings of wrought stone were always deemed of consequence —the name of a part of the Saxon palace is preserved, in "Whitehall;" and the principal feature of London's ancient fortress is the "White Tower." Both were so named, it may be presumed, from the whiteness of their constituent stonework, as expressed in the Idylls of the King—

> "In a long valley on one side whereof
> White from the mason's hand a fortress rose."

After the above severe attack, Islip resided alternately at Canterbury and Charing; but died at Mayfield on the morrow of S. Mark, 1366.

The hall had probably a recessed fireplace and flue, since a mantel in another room is dated 1371, only five years after Islip's death, when his nephew Wittlesey, succeeding Langham, had obtained the see. It was so at Ightham, of which Mr. Kempe says "huge timber logs, placed on andirons, still blaze in the capacious chimney of this most venerable hall." The arches at Mayfield have nearly the same curvature also as those at Ightham, and in the former the places of the supports for the rafters are apparent, but as I give one of these examples it is needless to reproduce the other. Mr. Street has supplied to the "Transactions of the Institute," 1864-5, views to show the remains and probable perfect condition of the palace hall. "It appears to me," he remarks, "to be one of the most noble designs it is possible to conceive." No tribute of admiration could be higher than this; and it comes, let it be remembered, from one whose

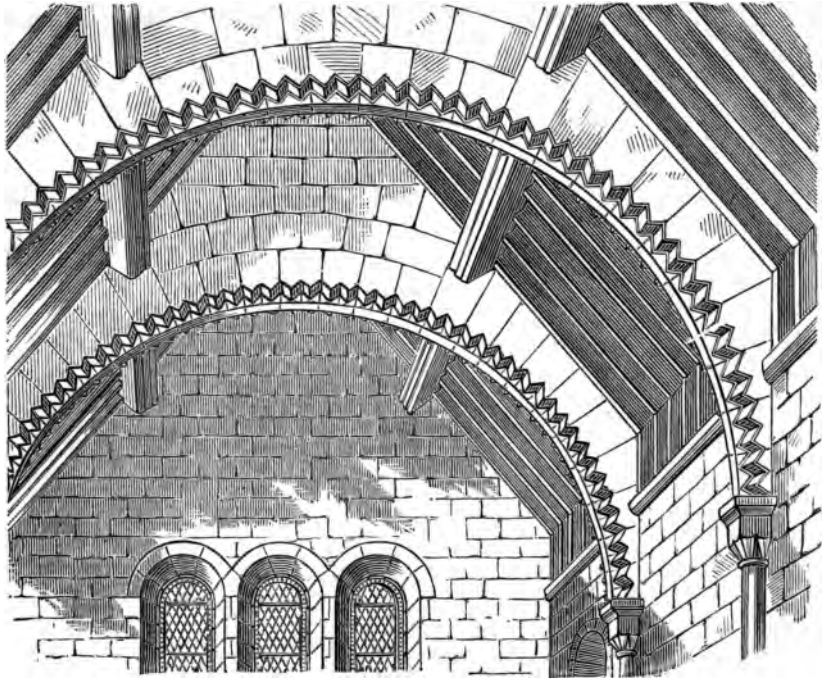
observation has been very extensive; who, like an energetic soldier, has followed his vocation unimpeded by family ties or home attractions, and can say, "I learnt my art by walking about England with a knapsack on my back."

As a modern instance of this kind of construction, I mention the chancel of Bedlington Church, Durham, a solid little work of Norman character, where Mr. Railton supported the roof with arches and gables of stone.

This engraving serves a second purpose. It was, I venture to assume, by exactly such arched ribs that the nave of Saint Peter's, Northampton, built by Simon de Saint Liz in the time of the Conqueror, was, as already intimated (page 7), intended to be spanned, though with more elaborate detail it may be, to accord with the rest of that rich and interesting edifice.

Here I propose to turn from the masonry of early times to contemporaneous works in timber, carrying onward a conviction that the true principles of British Carpentry can never be fully comprehended except through an acquaintance with the methods of masonic construction that constitute their very foundation.

The imperfect degree in which these principles and certain properties of timber had been mastered by our ancestral architects left them under great restrictions in design; and the forms of ancient edifices were often ill adapted to the wants of the projectors; but advancing science has found it difficult to invade arrangements that time has countenanced and custom sanctified.



THE CHANCEL, BEDLINGTON, DURHAM.

CHAPTER III.

GABLE ROOFS IN TIMBER.

We have been regarding at Ightham and Mayfield works in stone of the fourteenth century,—a century of unexampled architectural splendour, involving the entire range of that elegant, vigorous, and finished division of the Pointed style (characterised by flowing lines and exquisite tracery,) called the Decorated—the manifestation of graceful maturity in mediæval art.

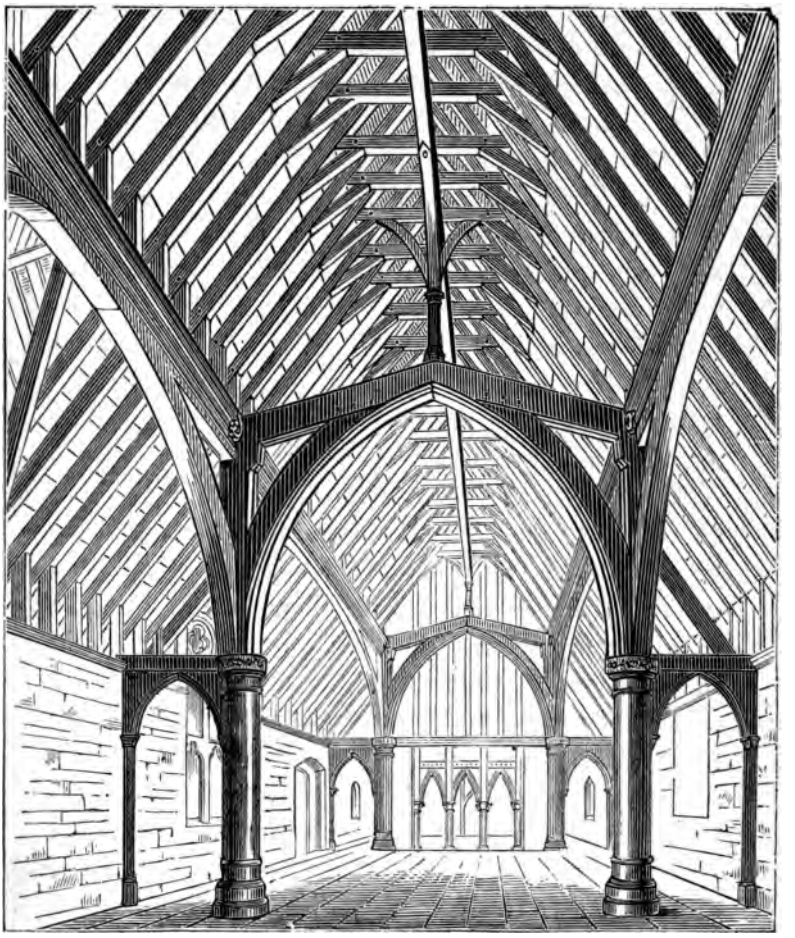
The practice of vaulting cathedrals and principal churches with stone had from an earlier period brought the conditions of structural stability into special action, and the exigency of flying buttresses had (before A.D. 1200) been displayed in a remarkable manner at Lincoln Chapter House, where the diameter of the room, including walls 4ft. thick, is but 70 ft., yet swells, with the buttresses, to 140 ft. The available building is a mere nucleus, occupying but a fourth of the area, in fact, taken up.

Walls and piers were the appointed bearers of loads, and if subjected to side strains, they were fortified by buttresses. It would not always increase our admiration of buildings if we examined too closely the amount of propping they require, and we might sometimes regard as a preposterous invention, that which formed one of the cautious steps of early artists towards their ultimate

triumphs. That their imagination was ever active, their judgment ever vigilant, is witnessed in the Chapter House at Salisbury; and how paramount an importance was accorded to *design*, is made evident by the wooden vaultings of the noble octagon at York. The thirteenth century architects have there left the stamp of a grand intention, but the want of later expedients obliged them to elect between abandonment, disfiguring counterforts, or execution in a light, but (when made to do duty for stone) simulative material.

The inference I desire to put forward is that builders of old were perfectly conscious that vaults and arches do not bind and tie walls together, but have a disposition, more or less active, to thrust them apart. Whenever, therefore, we meet with arches or curved pieces in timberwork, let us assume their intended operation to be by repulsion, and the support they afford that of passive resistance. It is necessary to say this, because the extent to which old rules have been overlaid and obscured by other systems is not commonly or sufficiently perceived.

Among the causes of a generally imperfect acquaintance with ancient carpentry may be included the lax and indiscriminating way in which merely antiquarian and amateur writers are accustomed to jumble technical terms of different epochs, dissimilar styles, and opposite principles, professing to teach an art of which they have no practical knowledge, and every word of whose vocabulary they misapprehend and misapply.



THE HALL OF NURSTED COURT, A.D. 1330.

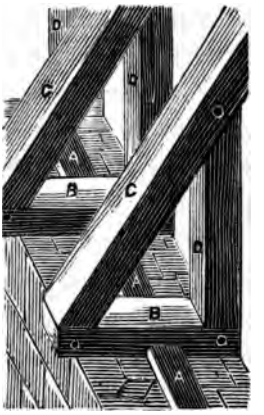
Nursted Court, from which the example before us is derived, was the seat of an ancient family in Kent. Sir Stephen de Gravesende is supposed to have commenced the buildings about A.D. 1283, and Richard de Gravesende, Bishop of London, to

have completed them in the next century, to the early part of which Mr. William Twopenny concurs in attributing the subject of this engraving. The hall with its lofty tiled roof was, as usual, the chief feature of an irregular pile constructed of flint walls, with Caen stone dressings to quoins, doors, and windows. Before its demolition drawings were taken by Mr. Edward Blore, with the accuracy for which his representations are always remarkable, and thus it has been figured in the "Gentleman's Magazine," 1837, and the "Domestic Architecture" of Turner and Parker.

The peculiar framework for supporting the roof at once attracts attention, and viewed in a progressive light well deserves consideration; but in order to appreciate its merit we must bear in mind the arcades and walls of other examples, and the solid gables that must have curtailed the view of the upper part of the roof. Here we find in their stead large purlins supported by curved struts and oak columns, with cross arches at intervals for giving stiffness to the whole. Mr. E. B. Lambe, who also made drawings, noticed some diminution in the columns, which in that respect differed from stone shafts of the period. The foliage of the capitals and terminations of the purlins were beautifully wrought.

In roofs of this kind the purlins were not always in contact with the rafters, but the connection was made by one series of vertical pieces of the same scantling as the rafters, and another series of similar pieces fixed horizontally.

Great care was taken to give the rafters a firm footing on the level top of the wall. A plate of moderate scantling was embedded along the centre, so as to leave about half its depth rising above the face of the stonework. Notched across this were pieces which may be termed sleepers, reaching from one face of the wall to the other at suitable intervals. The outer end of each sleeper received the foot of a rafter, and from the inner end there arose a vertical strut, flush with the face of the stone ashlaring of the wall, a circumstance from which these small timbers have received the name of ashlar-pieces. The ordinary construction is shown in the annexed figure.



ANCIENT MODE OF CONNECTING WALLS AND RAFTERS.

A A, wall plate, B B, sleepers, C C, rafters, D D, ashlar pieces. Every rafter had therefore a secure footing, and gravity and friction were turned to the fullest account. Moulded plates were occasionally framed to the cross-sleepers and ashlar pieces to form a sort of wall capping or cornice, and in other instances it was merely attached to the face.

The rafters of the opposite sides of the roof were in pairs, halved and pinned together at the top without the intervening ridgepiece of modern work; early roofs were frequently without any longitudinal connexion except that of the outer laths and thatch; but more was unnecessary. In examples

of very moderate span may be found rafters perhaps six inches by four used flat wise, and rarely more than eighteen inches apart. Even when ridge-timbers became general they were usually placed beneath the rafters, which were halved and pinned at the top as before. Pulham Church, Norfolk, may be instanced, and this method has appeared so convenient that I have adopted it in ordinary domestic roofing, trussing the ridge, which at the same time gives to the sill piece power to support ceiling joists.

The length of rafter at Nursted rendered necessary further support than was afforded by the base and apex, and purlin. A level strut was therefore introduced in each pair of rafters, to keep them from sagging under their heavy load of plain tiles. These level struts were upheld by a longitudinal plate or purlin in the centre, supported by shafts standing on the crowns of the arched principals; and such shafts are frequently called crown-posts. Further, to keep the struts up to their positions at the ends, there are auxiliary struts from the rafters themselves. Thus the tendency of the rafters to bend inwards under external pressure was counteracted by internal provisions, and the weight was uniformly thrown upon the walls or upon the assisting columns.

In some roofs the oblique struts under the cross-piece were carried above it to the opposite sides in a saltire figure, as at Lympenhoe Church, and in other cases a second level piece is framed higher

up from rafter to rafter, as at Stowe Bardolph.* Instances occur, though whether by design or accident is uncertain, where the upright ashlar pieces at the base, the portion of plain rafter, the raking struts, and the crosspiece or level strut, are all of equal length, and thus facilitate the formation of ceilings of seven sides, so common at one period in chancels.

It is possible that the plain-tile covering at Nursted may have superseded some other material. It is the heaviest of any commonly used substance, and three times as weighty as thatch, which was in general use at the time of this erection.

The pitch of the roof is well adapted for shingles, at that time in vogue, and though discarded where danger from fire is imminent, never entirely disused. The Saxon thegne, says Hudson Turner, "built his hall from the woods on his demesne, by the labour of his bondsmen; it was thatched with reeds or straw, or roofed with wooden shingles." They are now perhaps as much used in America and the West Indies, as at earlier, ascending even to Roman periods, in this country, and they seem to combine in a high degree the conditions of lightness and duration. Reduced to the proper form by cleavage, the fibrous character was unbroken, the inclined position and exposure insured abundant ventilation and the rapid passage of rain.

It is probable that the process of water seasoning was resorted to. Evelyn advises that boards

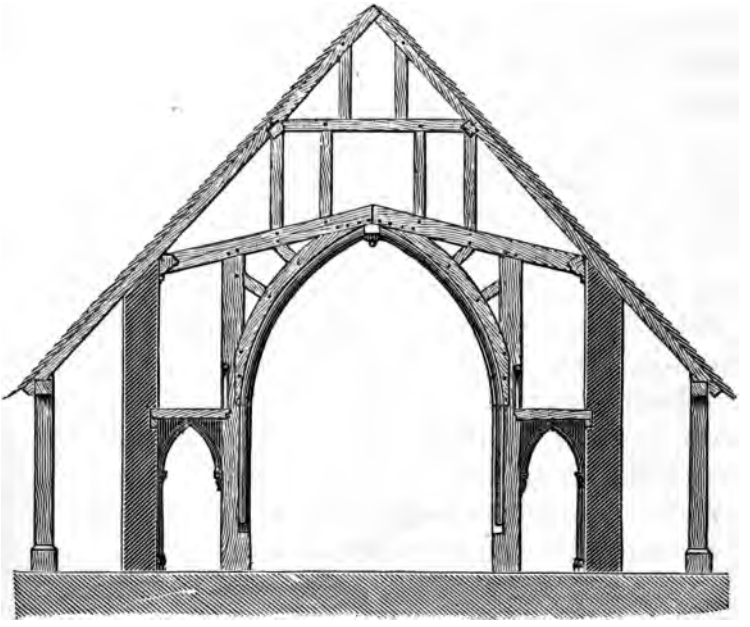
* Figured in "Brandon's Roofs."

should be laid a fortnight in water; if running so much the better. "I the oftener insist," he says, "on this water seasoning, not only against the worm but for its efficacy against warping and distortions of timber, whether used within or exposed to the air." The marginal sketch shows the spire-covering at Aldenham Church, Herts, where the gauge was four inches and the width about the same, so that each piece would be about ten or eleven inches by four. Such spires are very frequent in Kent and Sussex, and are known to possess extreme durability.

It must not be forgotten that as well for fixing tiles and shingles, as for giving firmness to the joints of framing, the carpenter employed no other fastening than wooden pins. These were of oak, and a better appliance could not have been found, as is attested by the revolution of ages. The use of trenails must have been coeval with the earliest attempts in ship building, and they still unite the planks and timbers of our "wooden walls." The posts and rails of fencing are among the objects also connected by wooden

SHINGLE COVERING,
ALDENHAM CHURCH, HERTS.

pins. The toughness of oak, and the expedient called the drawbore, enable the workman to bring the parts together with considerable force, though care should be taken to avoid an excessive strain. The application of trenails has been latterly extended to railway purposes in fixing chairs and sleepers, and a system of compression in heated dies, to give increased strength and prevent shrinkage, was patented some years ago.



SECTION OF A SCHOOL-HOUSE AT COVENTRY.

This specimen illustrates the notion of a gable d roof in timber, and it is not unlikely that the grea t barns of monastic establishments offered plentifu l instances of similar construction. Professor T. L. Donaldson has noticed that many tithebarns ex isted

in Wiltshire, "and with their centre and side aisles partook of a church-like character, while their roofs presented the finest combinations of carpentry that could be brought forward."

Coventry was an affluent and most picturesque city, rich in its cathedral and other foundations, and in buildings where woodwork was applied in a very ornamental way. After the destruction of the cathedral by order of Henry VIII., the early monastic works appear to have been to some extent incorporated with later constructions. Whether the object under notice had fulfilled any previous purpose is unknown, but so far as accounts reach, it is of later origin than I supposed. Near S. John's Church is Bablake Hospital, founded in 1506, by Thomas Bond, who had been mayor in 1497. His charity was included in the dissolution of guilds in 1547, but Edward VI. granted it in the following year to the bailiffs and commonalty of the city. Half a century later one Thomas Wheatley was suddenly enriched by the accidental consignment to him from Spain of a quantity of cochineal and ingots of silver, which the outbreak of hostilities may have kept from being reclaimed. He was by this means enabled greatly to aid a school for boys, commenced by the municipality in 1556, and now admitting seventy scholars, who are clothed in the costume of the sixteenth century. Thus in a fitting proportion Coventry reflects the custom and usefulness of the great metropolitan establishment of Christ's Hospital. The section is made through the boys' living room.

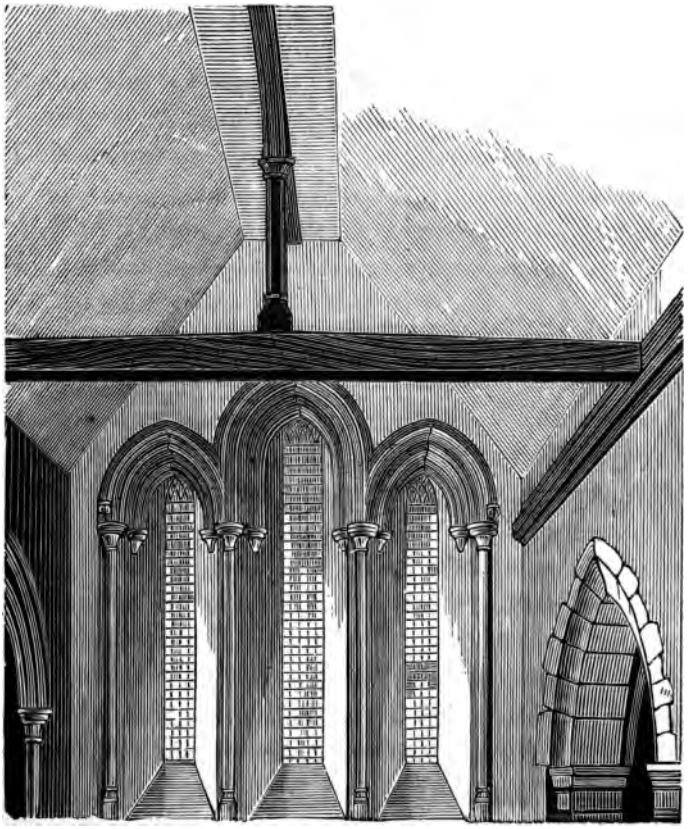
CHAPTER IV.

OF ROOFS WITH LEVEL BEAMS.

It will be convenient here to take another retrospective glance. I should be glad to see erased from the terminology of early carpentry the word *tie-beam*, and *truss*, in connection with it, as they are calculated to engender false impressions. When it is desired to bridge a rivulet, the simplest means of all is to throw a tree from bank to bank. If the tree be squared it becomes a beam, but nobody in the world I suppose would think of calling it a "tie-beam." What would be its relation to the banks? It would neither draw them together nor push them asunder, but would be a load, consisting of its own weight, plus that of any object upon it, and this weight the banks would have to support. The old word for a beam was summer, equivalent to the Latin *trabes*. The Oxford Glossary adduces from an indenture at Salisbury, 1445, "and every somr yn brede XVI ynches." It is obsolete, except in the compound *brest-summer*, which indicates a beam flush with the face of the work it sustains, and is familiar to us as the support for front walls over shops. Such beams, in other situations, are known as *girders*. They are employed for their power to bear a cross strain, and convey a load to supports under their extremities. This is precisely

the action of beams in old roofs. At their middle stood the *crown-posts*, performing just the same duties as at Nursted.

An instance of this is met with at the chapel of S. Bartholomew's Hospital, Sandwich, Kent. It is



BEAM AND CROWN-POST IN THE CHAPEL OF S. BARTHOLOMEW'S HOSPITAL, SANDWICH.

seated on the west side of the road from Sandwich to Dover (and though evidences exist of a some-

what earlier origin) is understood to have been founded by Sir Henry de Sandwich, about A.D. 1244. Leland states it to have been "*fyrst ordeined for maryners desysed and hurt;*" but this appropriation is uncertain. It appears from a customal, that at the beginning of the fourteenth century there was one connected building of a domestic kind, with a hall, bakehouse and kitchen. The brothers and sisters, of whom there are about sixteen, and between whose numbers no specific proportion is maintained, had separate chambers but not distinct houses as they have at this time.

The chapel is an interesting edifice, and contains a recumbent effigy of Sir Henry, of the Templar character, but the legs are not crossed. The roof appears to be original, but as the slopes are plastered, some of the chief timbers alone continue unconcealed. Moulded plates were laid along the inner face of the side walls, the mouldings being stopped and mitred at suitable intervals for the cross-beams. These cross-beams were halved down upon the plates, and one was placed just within each of the end walls, but as it would have crossed the windows abruptly, it was sawn off close to the plates, leaving its section distinct, and making the intention of the builders clear. The three beams of the inner bays are entire, and upon the centre of each beam stands a post, rising up to and supporting the ridge. Each post takes the form of an octagonal pillar in its lower part, with moulded base and cap. Above the capital the post rises square and unmoulded, curved struts branching off

in each direction as at Nursted, but here obscured by the plastering. Very similar forms exist at Barnwell, Cambridge, engraved in Le Keux's Memorials, and attributed to the same date.

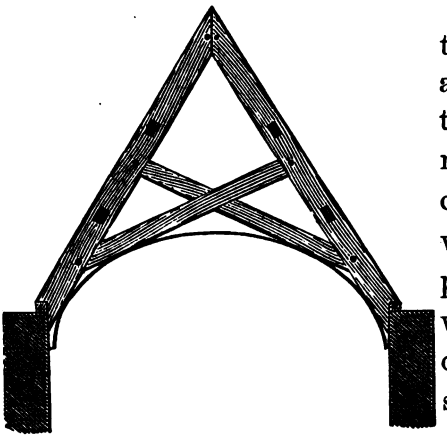
The beam was viewed as something to build upon, just as the stone arches were. In the old Chapter House at Ely, which was a square room, there were four piers on an inner square, from which arches turned in each direction supported a flat ceiling in nine compartments (Bentham's Ely). A *tie* intimates a pulling, but the old carpenters never knowingly subjected timbers to a tensile force, and tensile action is at the very root of our modern notions of a *truss*. That arches were deemed the proper supports for roofs may be seen in the nave of S. Martin's, Leicester; about 1350, and noticeable for its fine mouldings. The aisles also of that and many other churches have archiform supports in wood, and several are given in "Brandon's Roofs." It was as a beam and not as a tie that the foundation timbers of the cathedral roofs were employed, and it is the only way to justify their dimensions. It was as struts to resist compression by an outer force, and not as braces to draw other timbers together or suspend them, that the several parts of ancient roofs were applied. It was the fact of the beam being a foundation to build upon that led to its being dispensed with. "Our old architects were constantly varying their designs, with the object of improving the construction of their roofs, and very often with a view to dispensing with the horizontal tie-beam, which in many cases was felt to be an eyesore."

To the desire for avoiding the horizontal beam and its depressing effect, we are indebted for the most artistic examples of carpentry ever displayed; and wherever art has been promoted there ought to be no miserly consideration of cost. At Long Stanton, near Cambridge, a church with a total breadth of about 30 ft. is divided into a nave some 14 ft. in width, and side aisles. There are four sets of rafter bases, and the usual level and raking struts, but no tie. There was a very ample quantity of material, but it was openly shown, and probably attracted deserved admiration at the time of its erection. In roofs that were wholly shut out from observation by stone vaulting, "forests of timber" are found, and the very exuberant use is extolled by some architects of the present day, as evincing skill and *honesty* not paralleled in modern times; but we are bound to reflect that what was perfectly honest and even skilful in the fourteenth century, would not disarm a casuist of the nineteenth; and the professional enthusiast who, without first ensuring the connivance of his employer, should expect credit for concealing in the loft of some edifice an enormous and unnecessary amount of fine timber would be likely to find himself the hopeless defendant in an action for damages.

Disregarding strict chronology it will be more serviceable here, than later, to notice two or three examples that seem to prove conclusively the strutting and antitying principle of ancient timber work. At the church of Old Basing there are principals with cross struts of bent timbers which could exert no appreciable influence in a pulling or tying

ROOF OF OLD BASING CHURCH, HANTS.

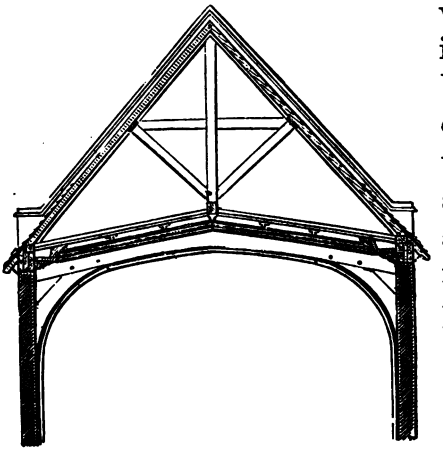
direction. This example also displays purlins and arched wind braces, so that the common rafters rest upon a framework instead of being self-sustaining.



ROOF OVER COUNCIL-ROOM, CROSBY HALL.

The roof over the Council-room at Crosby Hall, has the saltire struts, making each pair of rafters complete without ridge or purlins; but it was intended to be concealed, and the struts are straight.

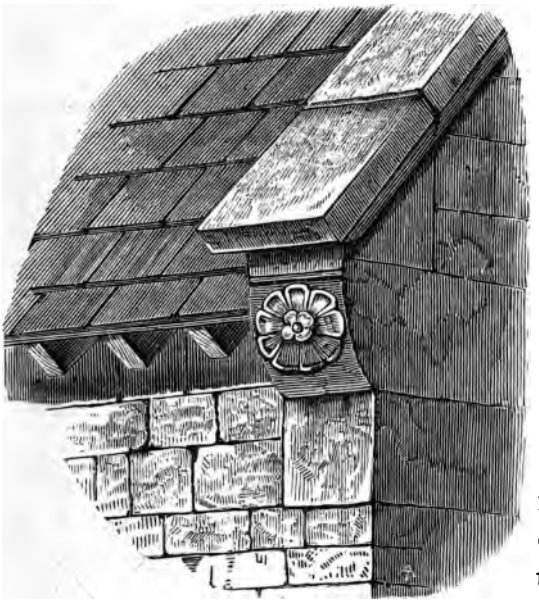
Again, in the domestic chapel of the archiepiscopal palace at Croydon, a late erection, with panelled ceiling, the principal beam or girder is converted into a very flat-pointed arch by supports at the haunches from the wall-posts, and the back of the girder has a considerable rise towards the centre. It thus presents a con-



ROOF OF CHAPEL, CROYDON PALACE.

vexity where subjected to cross pressure. On the apex of this beam stands a crown-post with a horizontal cross strut at half its height, supported at the ends by raking struts from the centre of the beam, giving a firm rest for the purlin ; and the full share of weight is thrown upon a timber especially adapted to convey it safely downwards.

The rafter-feet, and covering, were frequently carried beyond the face of the wall, as at Godshill Church, Isle of Wight.



EAVES AT GODSHILL.

In order that the noble works of our ancient carpenters may be appreciated, intelligently repaired, or successfully imitated, it is essential that their constructive principles should be rightly comprehended ; and having insisted upon a clear understanding on this point, I shall proceed to exhibit their application in some of the grand monuments of an art for which our native builders were held in paramount honour—works nowhere surpassed, and rarely approached by contemporary artists of other nations.

CHAPTER V.

GREAT TIMBER ARCHES WITH HAMMER BEAMS.

THE roof of Westminster Hall opens a new era, and so magnificent an example deserves the most considerate attention. The foundations of this grand room are referable to William Rufus, who held his court here on returning from Normandy in 1099. The detailed form of his building can only be judged of by analogy, and the strongest probability attaches to the tripartite arrangement of Oakhampton, Hereford, and other coeval instances. The late Mr. John Rickman, assistant clerk of the House of Commons, printed a pamphlet quoted by Brayley, to show that the difficulty of explaining in what manner such a span of roof could have been supported before the flying buttresses were erected was done away with by the development in 1820 of an ancient triple doorway at the north end, indicating that the hall was originally divided by pillars of wood or stone, so as to form a nave and side aisles in the manner of a large church.

Flying buttresses belong to the thirteenth century, and were utterly unknown as a separate building expedient in the eleventh ; although virtually the arched ribs of aisle roofs, such as we have noticed at Hartlepool, were flying buttresses to the nave against whose walls they abutted. Roofs of great span were altogether incompatible with the

condition of mechanic skill in the Norman age, and the long gallery-like form of all considerable apartments was the inevitable and attesting consequence. Before the usages of those early times had been wholly discontinued, when the hall "used in the day for the patriarchal hospitality of the owner became at night a sort of stable for his servants," little inconvenience may have attended the slight separation of side and central portions, but with greater delicacy of manners new arrangements of domestic interiors were adopted, and when distinct sleeping apartments were provided the old columnar divisions of the hall became more than ever obstructive and obnoxious.

Had the capacity for spanning a room nearly 70ft. wide been anywhere proved in the time of William the Second, the very inferior displays for 250 years afterwards must have been precluded. Mr. Sydney Smirke cannot perhaps be said to have combated this notion by merely stating that no vestiges of foundations for columns were found in the course of repairs conducted by Sir Robert and himself, and that rooms of equal width had been covered by single roofs in Italy. Mr. E. J. Carlos suggests that if wooden columns, as at Nursted, were employed, the non-discovery of foundations might be easily accounted for, and both he and Mr. Twopenny incline to the hypothesis of divisional supports of some kind. Wooden posts were earlier in use, it may be, than stone columns, but the latter are more in unison with the general conception of a royal palace of the time, and their complete dis-

appearance seems the less to excite surprise, as a patent was directed in 1394 to John Godmerstone to repair the great hall and sell old materials; so that it may be received as certain that whatever was unsuited to remain or was capable of being again worked up, would be wholly removed from its original situation. Mr. Smirke tells us, indeed, that much wrought stone was discovered among the ashlaring of Richard the Second's time. He says, also, "That the roof (that of Rufus) was not similar to the present one is indisputable, for the external buttresses which resist the pressure of the present principals formed no part of the Norman walls, nor can we point to any evidence of practical skill in carpentry on the part of the builders of William the Second's age, equal to the execution of so bold a task." (Archæologia, Vol. 26.)

The Palazzi della Ragione, or halls of Justice at Vicenza (operated upon by Palladio) and Padua afford no real precedents for Westminster, and though of ancient Gothic character, have most likely undergone similar changes. That at Padua was built by Pietro Cozzo between 1172 and 1219. "A vast roof like that at Vicenza towers above the edifice, rising perhaps half as high again as the walls upon which it rests. This roof is said to be the largest unsupported by pillars in the world. The hall is above 240ft. long and 80ft. wide, as much in height, and not quite rectangular." But the roof is not of the early date of the foundations. "In the year 1306 there came to Padua a renowned architect and engineer, an Austin friar, Frate Giovanni, by name.

He had travelled far and wide in Europe and in Asia, to the very Indies, and he had brought back plans and drawings of all the buildings which he had seen, amongst others a drawing of the roof of a great palace in India beyond the sea. This design greatly pleased the Paduans, and they requested him to roof their hall (which had previously formed three chambers) in like manner, and Fra Giovanni assented, asking no other pay excepting the wood and tiles of the old roof which he was to take down." (Murray's "Northern Italy"). So that this Italian discursion, instead of supporting a theory, or disturbing the presumption of columns, collapses under the touch of investigation, like a house of cards.

Much more ample information than has yet come to light concerning the Westminster renovation is to be desired, but of the fragmentary history one of the chief documents is that in Rymer's Fœdera, A.D. 1395, An. 18, Ric. 2, commencing "*Ceste Endenture faite parentre nostre Seigneur le Roi d'une part et Richard Washbourn and John Swalwe, masons, d'autre part. Tesmoign que les didtz masons ont empris de faire bien et loialment toute la table des mures de la grande sale deinze le palays de Westmonstier d'une part et d'autre. La quele table sur montera l'ancien mure deux Pees d'assise parmy la dite mure.*"

These particulars show that alterations were in progress from 1394 to 1398. Nor is it at variance with the length of time commonly required for the preparation of works of such magnitude to suppose that the new roof was not only designed, but put

into actual preparation before the old building was disturbed. There was no such lapse of unnoticed years, we will assume, as between the projection and complete execution of the new roof at Guildhall; and artificers were subject to impressment; but we cannot, on the other hand, conceive as existing in the fourteenth century the organisation that produced those sudden, magic-like effects witnessed in the gigantic halls for modern international exhibitions. There must have been designs and devices, models and "patrones," forms and moulds to prepare, and trees of suitable size and curvature, it may be presumed, to select in their native seats, making the term assigned seem short.

A.D. 1398 was the last of which Richard saw the end, and the manner of inaugurating the Westminster roof was more suitable to a work of entire novelty than even the most successful renovation of a pre-existing object. It took place at Christmas, and the king kept the festival "in a most royal manner, with every day justings and running at the tilt, whereunto resorted such a number of people that there was every day spent xxvi. or xxviii. oxen, and 300 sheep, besides fowle without number. Also the king caused a garment for himself to be made of gold, silver, and precious stones, to the value of 3000 markes." Beneath the same majestic roof four centuries and a quarter later took place the most remarkable display of modern pomp—the coronation of George IV., when it had undergone a thorough repair by Sir Robert Smirke with old ship oak from Portsmouth Dockyard. The walls were

at the same time refaced internally with 6 in. Huddlestone ashlar. The lengthening of the hall southwards, and piercing the east wall to suit the new Palace of Parliament, were done by Sir Charles Barry.

About such a building as Westminster Hall there ought to be no lack of information, yet much uncertainty exists. If we inquire into the authorship of the present roof, conjecture points to the "distinguished architectonic prelate," as Britton calls him—William of Wykeham. Several biographies have been written, and the best is that of Dr. Robert Lowth, Bishop of Oxford ; but there are some valuable annotations, by Dr. Ingram, in his Oxford "Memorials" (Art, New Coll.) "The genealogical history of some of the greatest benefactors of mankind is buried," observes this author, "in comparative obscurity. Of many individuals respecting whom very little is known but that they lived, and that they died, the pedigree nevertheless is usually traced, with heraldic precision, to the remotest verge of antiquity. We can number the various branches of some insignificant families, with their affinities and descents, and mark their progress from the parent stem ; whilst everything connected with the domestic annals of a Wykeham, a Waynflete, or a Wolsey, is left in a state of considerable doubt and uncertainty." Must it not cease, then, to be strange, if little be authentically known about the construction of an edifice that stands by its intrinsic qualities so grandly out as does Westminster Hall among its more accurately recorded contemporaries?

Biographers are divided as to the place of Wykeham's education, but there are grounds for supposing that he spent some (Wood says five and a half) years at Oxford, though in circumstances too straitened to command the full advantages of the university. He had indeed no "scholarship," but it would be as unjust to insinuate as it is impossible to conclude that he was no scholar. His studies embraced mathematics, logic, divinity, and law. "His architectural genius," Dr. Ingram suggests, "led him perhaps to prefer Euclid to Aristotle," and for practical matters Chaundler gives him the highest credit. The general appellation of academical students, "Clericus," appears in all the patents granted to him before he obtained any church preferment, and he is described as "a person of as great genius, as extensive knowledge, and as sound judgment as any which that age produced."

On the completion of his studies he entered the service of his early patron, Sir Nicolas Uvedale, Constable of Winchester Castle, and William de Edynton, Bishop of Winchester, also employed him as agent, clerk, and attorney. At the Castle, he no doubt, found exercise for his skill in geometry and drawing, talents that were eminently calculated to attract Edward III. when he came from Portsmouth to spend some days there, and at a time when he had similar constructions of his own in contemplation. At all events, Edward seems to have invited Wykeham to court, where he first appears as Clerk of the King's Works in 1356, at the age of thirty-two. Once in the sphere of eccle-

siastical patronage he went into orders, and received the rectory of Pulham, Norfolk, in 1357, from which period his twofold greatness proceeded in a remarkable parallel. His benefice caused no relaxation of his secular duties or business habits, but was accepted and regarded as the consequence and reward of activity in the service of his royal master, a testimony of the satisfaction his great ability afforded. So completely did he become the king's man of business that Froissart said "everything was done by him, and nothing was done without him."

In April, 1359, he was appointed *superior operationum in Castro, Windsor*, and in attendance on the king at Calais, in 1360, he witnessed, as public notary, the treaty of Bretigny. The rebuilding of the castle was in active progress: "360 workmen were impressed to be employed on the buildings at the king's wages, some of whom having clandestinely left Windsor, and engaged in other employments for greater wages, writs were issued to prohibit all persons from employing them, on pain of forfeiting their goods and chattels, and to commit such of the workmen as should be apprehended to Newgate."

Wykeham's office was extended in 1361, he being now Chief Warden and Surveyor of the King's Castles of Windsor, Leedes, Dover, and Hadlam, and of the manors of Old and New Windsor, Wichmer, and several other castles, manors, and houses, and of the parks belonging to them. In 1363 he became Warden and Justiciary of the King's Forests on this side the Trent. He had power to appoint

all workmen, to provide materials, and to order everything with regard to building and repairs, to hold leets and other courts, pleas of trespass and misdemeanours, and to inquire of the king's liberties and rights. Soon after this he was made Keeper of the Privy Seal, and "Governor or Chief Speaker in the great council of the nation." Thus in him were centered the affairs of sundry modern departments conducted by several of Her Majesty's Chief Officers of State.

He built for the king in the Isle of Sheppy a castle, to which the name of Queenboro' was given, in honour of Philippa of Hainault, and a charter was given to the township in 1366. This castle was a large, strong, and magnificent edifice, but having no platform for cannon, nor command of the sea, it was demolished after an endurance of about three centuries. His talents are said to have been equally displayed at the castles of Leeds* and Dover, both of which are also in Kent. "Although in these military structures," it has been remarked, "he had little scope for the genius displayed afterwards at Oxford and Winchester, they would have been sufficient to prove that he had already reached that degree of architectural skill which modern art can

* Leeds Castle, about five miles from Maidstone, had a good command of Central Kent, and is now a picturesque group of walls and towers and turrets, rising from a wide and lake-resembling moat. Three islands were separately fortified, and three distinct sieges necessary to its reduction.

but poorly imitate." With his appointment to the bishopric of Winchester, on the death of his early patron, de Edyngton, in 1366, came enlarged opportunities for his favourite pursuit. He had now several palaces, and the princely revenues that enabled him to carry noble conceptions into perfect execution. The fruits of this elevation, however, are less discernible in the remainder of Edward's reign than in that of his successor, but the king's works probably received unabated attention. A writ to the sheriffs of different counties to impress 302 masons and diggers of stone was followed the year after by an impressment of glaziers, and operations were continued at Windsor till 1373. Wykeham must have been on terms of intimacy with all members of the royal family, but as the interests of those members diverged it must have grown difficult to maintain an equal friendship with all. He seems to have been in perfect accord with the Black Prince ; Richard II. regarded him with unqualified respect; but he had no friend in John of Gaunt, nor probably in Henry IV.

Attached to the see of Winchester were several residences—palaces, not merely in name, but importance. That in the metropolis was at Southwark, and the site of "Winchester Park" is now occupied by Southwark-street and a populous neighbourhood. There were palaces at Wolvesey, and South Walsham, his favourite abode. (He died there Sept. 27, 1404.) Farnham Castle, a sumptuous seat, maintains the position of a chief provincial residence, and continues in the occupation of the

venerable Bishop Sumner, who has lately resigned the episcopal charge of the diocese. To this distinguished prelate Mr. Elmes dedicated his work upon dilapidations.

Wykeham's ever useful life is seen in its grandest aspect during Richard's reign. High in the king's favour, high in state and church, and high in temporal possessions, with his own elevation arose his munificent schemes for the promotion of learning and piety, dictated by the wants of his time, and deserving the gratitude of all coming ages. To these objects he devoted, with equal freedom, his pecuniary wealth and refined architectural skill. Some preliminary steps had been previously taken, but the king's license to found "Seinte Marie College, of Wynchestre, in Oxenford," is dated June 30th, 1379. The foundation stone was laid in March following, and occupation commenced April 14th, 1386. The popular appellation given to this establishment soon after its foundation has never been withdrawn, and it is now, as then, "New College." At Winchester, upon the site of the school where he had been taught, the college was begun in 1387, and entered upon March 28th, 1393.

In 1394 Wykeham undertook the rebuilding of Winchester Cathedral, and by agreement with the priory and convent, he was to re-use the old materials. He employed William Winford as architect, Simon Membury was his surveyor; and John Wayte, one of the monks, acted as controller on the part of the convent. The general character of the building was Norman; and so the central tower and

transepts remain, "but the nave," according to Rickman, "has had its piers cased, and the appearance of its walls much altered by the insertion of Perpendicular windows, the addition of Perpendicular buttresses to the North aisle and of a very magnificent West front with three porches of a character very uncommon, the groining of the nave being remarkable for its intricacy and richness." The West front was in point of time and expense the work of Bishop Edynton; but as an artistic invention it is in all probability due to Wykeham. Thus for half a century this eminent man is known to have been engaged in buildings of conspicuous consequence and the highest merit. "The architecture of William of Wykeham," Dr. Ingram observes, "is peculiarly his own. Its characteristics are simplicity, elevation, grandeur, and stability. He built, as he always thought and acted, for posterity. His masonry is distinguished by the soundness of the materials and the judgment displayed in the disposition of them." He exercised a nice discrimination in the treatment of works according to their destination, from the massive boldness of military bastions to the minute finish of ecclesiastical detail. In the quadrangle at New College "a modest simplicity characterises the domestic part, while the gateways seem formed more for strength and security than ostentation or splendour. The hall rises in grandeur as destined for magnificent hospitality, though it by no means pretends to rival the adjoining sanctuary of religion. The only defect in this hall is the flat modern ceiling.

It was originally arched with timber-work, and had a louvre or lantern in the centre for the transmission of smoke from the charcoal fire beneath."

I have now perhaps made a sufficient recital to justify an inquiry whether it is not of the nature of certainty that Wykeham, *superior operationem Regis*, must have been the artistic inventor and scientific contriver of Westminster Hall, as opened with royal *éclat* at Christmas, 1398 ? Thomas Rickman says of it: " The North front of this edifice is one of the earliest as well as best specimens of the Perpendicular style, every distinguishing feature of the style being here exemplified. The interior has Norman walls below; and above the arches are filled with Perpendicular tracery, and from stone corbels of that date spring the ribs of the wood roof—the largest, and, on the whole, the most magnificent wood roof in the kingdom." The masonry exhibits the impressive and simple dignity for which Wykeham is accredited. Here, as at Winchester Cathedral, Norman foundations were retained, the old free-stone was worked up, and a new appearance imparted.

The projecting entrance porch of the one is presented, not in a copy but a free translation of the other. Similarity may be traced in the great windows, the boldly coped gables, and the effigied apices. Notwithstanding the heavy disfigurements and modern obliterations at Westminster, something of the outline of the flanking towers of the north front has been preserved. Those towers are without buttresses, have level battlemented tops, and at

one angle of each the customary octagonal turret, rising some feet higher than the roof of the tower, to which it gave access, is found. Their agreement with one at New College is exact. "It consists of four horizontal compartments, exclusive of the base and battlements, diminishing gradually and almost imperceptibly from the base to the summit, which is ascended by a winding staircase of stone within, terminating in an octagonal turret at the south-west angle. This was perhaps the last production of his mighty mind in Oxford." (Ingram.)

The timber-work, as compared with the masonry, has equal merit and pre-eminent grandeur. It displays a truly wondrous combination of artistic power, scientific skill, and practical experience. It was by itself enough to make a reputation, and that it should have escaped a lasting association with its author's name is most naturally to be accounted for by classing it with the unnumbered successes that formed the basis of Wykeham's celebrity. The bishop was among the king's surest and most loyal friends, often entertaining him, together with his queen Isabella and all their court, with the most unbounded hospitality and magnificence. In 1394, the year of the patent to Godmerstone, a royal visit was made, July 25, at Wolvesey, and another there and at Farnham in September, when the party dined with the bishop two days in succession at those venerable mansions, the total retinue on one occasion numbering 366 persons.

Where so cordial an intimacy existed opportuni-

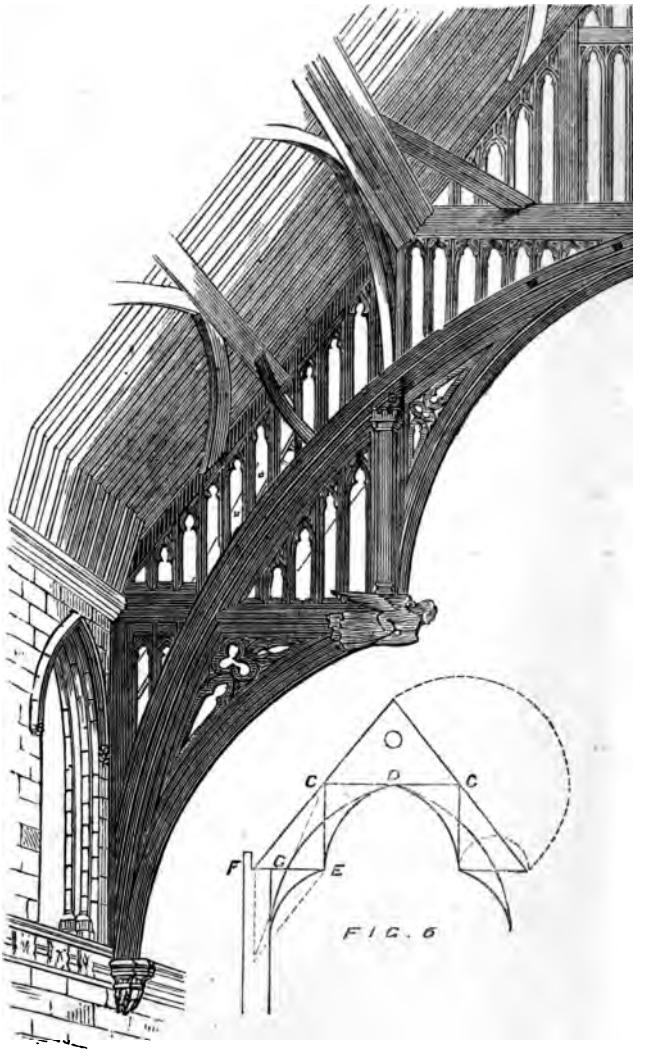


FIG. 6

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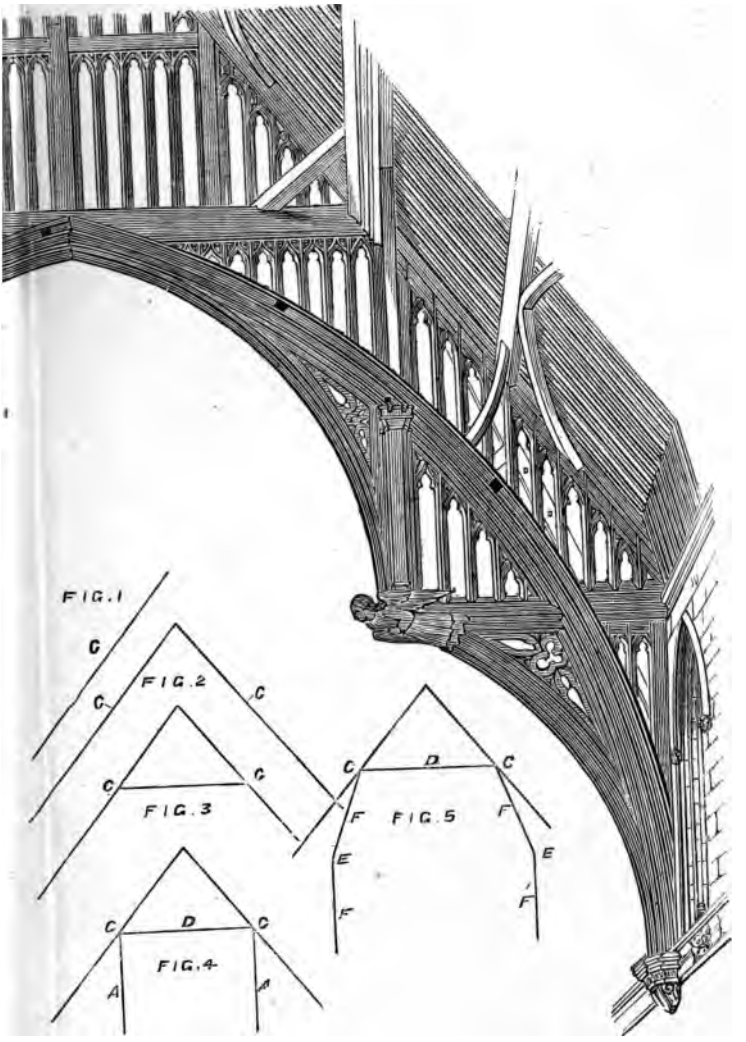


WESTMINSTER HALL.

llow page 48.)

ties could not be wanting for the attentive discussion of plans and models for the new work. The joyous celebration of its accomplishment, too, may have been intended as homage alike to the famous architect and this most famous design, while the next reign commenced with circumstances and actors more calculated to throw both into discountenance and oblivion.

I deem it certain that the stone ribs of Ightham and Mayfield were anterior to Westminster, and that both of those buildings must have been known to Wykeham, who, on the king's business, and in relation to his archbishop, was necessarily familiar with the county of Kent. With such models before him he had a sufficient index to the next progressive step. Though not easy to effect, it was clear in purpose and direction. It consisted in the substitution of frames of wood for arches and gables of stone, carrying mechanical science from one material to another, and infusing into carpentry constructive principles that were previously the mason's own.

The roof at Westminster was evidently based on a scheme of equilibration. If, for instance, the line A B (fig. 1) represents the sloping plane of one side of a roof, the centre of gravity will be at C, so that were the plane supported at that part no change of position would occur. If the complemental side of the roof were added it might be supported at a corresponding point, and therefore a roof of such a form might be poised on the supports at C C (fig. 2). Were the sides connected by a horizontal beam D

(fig. 3) the middle of that beam would be the centre of gravity for the entire frame. A roof, therefore, constructed according to diagram 4 would be in equipoise, the points C C being supported by the upright posts A A, and these kept in position by the horizontal strut D. Again, it would be possible to substitute for the vertical posts A A compound supports of the form shown at F F, diagram 5, provided the tendency to spread at the angles or joints E E, were counteracted. This is in effect the compound support presented by a stone arch, as at Ightham and Mayfield. It would be judicious in the construction of such a roof to have supports at C C, and this will be found to have been followed in practice. D is the point assigned to the apex of the great supporting arch, and the weight at C C is collected by massive purlins with arched supports, as at Nursted. But if the weight were collected and thrown on to the arch at D it would tend to depress the curved rib, and cause it to give way at the sides. By a happy expedient, however, the load was thrown upon the arch at a much stronger point G, in diagram 6, at about one-third of the rib's total length from the springing.

We must now suppose the length of the rafter divided at C, and the weight of the upper part brought by the arch and purlin on to a point E within the arch, while the weight of the lower part of the rafter is transmitted to a point F, at an equal distance from the rib on the outside. These two points are connected by a strong beam, and the joint weight is brought on to the arched rib at G—

at either end, half the weight of that side of the roof. Assuming, then, the arch to be rigid and strong, and supported at the feet only, it would bear the nicely balanced superstructure. But to obviate the possibility of vibration, F is steadied by the wall, and E by those curved struts, from above and below, that constitute the gigantic trefoil cusping of the interior; while the crude skeleton is clothed with elegance by the mouldings and tracery, that give at the same time firmness to the work. The walls were kept upright by enormous flying buttresses, the need of which has been in some places superseded by other constructions, but some of the originals remain next the yards of the adjacent Law Courts. The composed stress of the arched oak rib scarcely went beyond the thickness of the walls, as indicated by the oblique line C G fig. 6.

In this way the peculiar design of the Westminster roof may be accounted for on principles accordant with the demands of actual utility, justifying Dr. Young's remark that "the Gothic architects made every essential member of their buildings a constituent part of their system of ornament; and things which, by a superficial observer might be deemed useless or prejudicial, serve, either by their strength or weight, some beneficial purpose." Here was a new and unexampled adventure—an instance of invention and construction unquestionably arising from the most advanced knowledge of the period—a period, let it be remembered, ten years prior to the death of him in whom such knowledge was conspicuously centred—William of Wykeham.

Upon no other theory, than as rigid chief supports, can the presence of the great arches be satisfactorily accounted for. They have, it is true, been elsewhere spoken of, in a somewhat perfunctory manner, as arched *braces*, and so degraded to a subordinate office; but it must be allowed that they *appear* to support the weight of the roof; and if they, in fact, perform no such duty, we are invited to contemplate an idle parade of false sagacity and a laborious fabrication that excites admiration only when it deceives. I accept no such solution, and although the load may have ceased to fall with original force and *aplomb*, I look no further for the cause than to the shrinkage and self-adjustment due to the enormous size and complicated framing of these majestic principals.

CHAPTER VI.

ARCHES WITHOUT HAMMER BEAMS.

The Great Chamber at Lambeth Palace.

The carpentry of the fifteenth century, to which I now turn, admits of illustration by well authenticated examples. Of these, indeed, many exist, but the absence of a more ardent and general spirit of conservatism with respect to monuments so deeply interesting for their art treatment, historic evidence, and antiquarian value, is much to be deplored. In this respect, however, I read with great satisfaction a paragraph from the Report of the Council of the Royal Institute of British Architects to the annual meeting, May 2nd, 1870—viz., "The Council have not relaxed their vigilance in the important duty of promoting the conservation of ancient monuments and remains. But scarcely a single instance of neglect or threatened demolition has of late been brought under their notice, and they trust that this fact may be accepted as an evidence that greater care is now exercised in the repair and restoration of buildings remarkable for their architectural or antiquarian interest."

The roof of the Great Chamber or Guard Room of Lambeth Palace is a most elegant specimen of artistic carpentry. The form of the arch, the mouldings, and the tracery seem to justify the assignment of this work to the early part of the century; and

it is noticed in the steward's accounts in 1433. A battlemented wall-cornice is supported by arches with tracery spandrels, and the principal ribs are also enriched and lightened by perforated tracery. The wind-braces on the sloping sides are treated in a similar way. The stone corbels from which the principals spring are of the compact form, with carved surfaces, allied to an earlier date (I have found them elsewhere with fourteenth century masonry); but we may be sure they are appropriate to the style, whether Mr. Blore, in repairing this room for Archbishop Howley, found any guide for restoration, or simply gave the impress of his own great experience, both as an antiquary and an architect. During those repairs the capability of the roof to stand alone was put to the test, as the walls were taken down, and the roof left dependent on its ribs and arches for support. The strong iron bands were no doubt then attached to the main ribs; but, though somewhat of a disfigurement, they afford evidence of the care with which it was sought to preserve the original material and workmanship; and a valuable precedent is thus brought under the notice of too active restorers. The Archbishops of Canterbury, like other incumbents, are bound to protect their temporalities from dilapidations; but they are justified in deferring renewals till the latest possible time, and to this wholesome rule we are perhaps indebted for some of the most ancient and interesting remains of ecclesiastical architecture. We are thus enabled to contemplate not only the forms, but the unchanged materials

upon which [illegible]
part of the [illegible]
to have gazed [illegible]
prelate thir[illegible]
ham is said [illegible]
have imitated [illegible]
man. Like him [illegible]
a founder of [illegible]
He was at [illegible]
of Rouen. M[illegible]
he visited the [illegible]
metropolitan. He was [illegible]
energetic. As [illegible]
his endowment [illegible]
at Higham F[illegible]
additions, and f[illegible]
Cathedral was [illegible]
tion of magnifi[illegible]
been alone sur[illegible]
to have expended [illegible]
than £120,000. Having [illegible]
as primate—a longer term than any predecessor
for five hundred years—[illegible] April 12,
1443, and was buried under the [illegible]
had erected in his cathedral.

upon which Archbishop Chicheley, to whom this part of the palace is attributed, may be supposed to have gazed with appreciative delight. This great prelate, thirty-eight years later in birth than Wykeham, is said to have known the friendship and to have imitated the example of that distinguished man. Like him, he was an active minister of State, a founder of colleges, and a patron of architecture. He was at times in the camp, and saw the sieges of Rouen, Montereau, and Melun. As diplomatist he visited the courts of Rome and France. As metropolitan he was prudent and discreet, firm and energetic. As a public benefactor we may look to his endowment of two colleges at Oxford and one at Higham Ferrers. His expenditure in repairs, additions, and founding the library at Canterbury Cathedral, was very great; while in the construction of magnificent apartments at Lambeth he has been alone surpassed by Dr. Howley, who is said to have expended there and at Addington, not less than £120,000. Having passed twenty-nine years as primate—a longer term than any predecessor for five hundred years—Chicheley died April 12, 1443, and was buried under the alabaster tomb he had erected in his cathedral.

CHAPTER VII.

SOUTH WRAXALL.

It may not be uninteresting to notice as we pass one of the modes in which English country houses have been called into existence. In relation to them, we frequently meet with the term "manor," and so are led to an institution of probably Saxon antiquity. The king at first granted, it is assumed, to some baron or man of importance, a circuit of country for him to dwell upon, and over which to exercise such jurisdiction as was entrusted to him for maintaining the peace. He was, in return, to render stipulated services to the king. Such territories were called baronies; but this word has given way to "manors," in reference to the permanent habitation of the place by the owner and his heirs; though in these days we rather understand the incorporeal royalty or jurisdiction than the land, for one may enjoy the right and perquisites of a court-baron, while others possess the soil.

When the owner of a barony parcelled the colossal tenure out to subordinate holders they became his tenants, and he remained the tenant of the king. Some manors or honours were of a chief or capital kind, having other manors under them, and then the king-tenant was called a lord paramount, and had great authority. An account of the manors existing in the reign of Edward I. was

taken in 1290, and from that time, as the political or executive privileges centred in the lord, they were no longer severable and assignable with portions of the land. Subsequent offshoots were, however, occasionally so large as practically to carry with the part, in its extent, the previous custom of the whole, but, not being strictly legal, they have been designated *reputed manors*.

To the barony of Anglo-Norman times there was attached the strongly-fortified castle; but the *aula*, *halla*, or *haula*, a hall, or chief mansion, was the usual appendage of the manor, and was capable also, in some cases, of great resistance to attack. Thus was brought into existence a secondary class of residences, well exemplified at South Wraxall, near Monkton-Farley, Wilts, a few miles from Bath. The proper manor-house is not, therefore, like a modern mansion, to be copied and multiplied without limitation, since it is in necessary annexation to a demesne and court-baron. South Wraxall was formerly part of the manor of Bradford, and included in the possessions of the richly-endowed abbey of Shaftesbury. The abbess and convent, in the 25th Edward III. (1351-2), manumitted Thomas Scathelok their *villain*, and granted to him and Editha his wife, daughter of Roger le Porter, one messuage, and two virgates, and nine acres of land, and four acres of meadow, with appurtenances, in Lyghe and Wrokeshale, within the manor of Bradford.

South Wraxall became in time a distinct property, and was for many generations the seat of a

ROOF AT THE MANOR-HOUSE, SOUTH WRAXALL.

family named Long, a cognomen derived from the tall stature of their ancestor, and numbering in its modern ramifications Miss Catherine Tilney Long, who in 1812 married William Wellesley Pole, Esq., and he thereupon assumed the name of William Pole Tilney Long Wellesley.

Britton, in his "Beauties of Wiltshire" (1825), says:—"The mansion of South Wraxall, a large, ancient, irregular edifice, is now occupied by the Rev. Dr. Knight, and used as a boarding school."

The founder of the edifice is supposed to be Robert Longe, a justice of the peace, who was returned to Parliament, as member for Wilts, in 1433; and he has the credit of originating one of the most complete examples of domestic architecture and house arrangement that, size considered, remains to us of that age—an age when in the midst of state turmoil there was great popular progress. Commerce and industry advanced, and the fusion of classes that gave rise to the important body of English gentry, was perceived to be convenient and beneficial. South Wraxall may be said to present *the gentleman's house* of its date. There is the original portion of the Longe Howse of the time of Henry VI. There are additions of the reigns of Elizabeth and James the First, and also some modern adaptations, but the features of an ancient residence may be seen without essential change. The characteristics of the masonry afford excellent illustration of minute and careful design, and give confirming testimony to the date applied. In the perfect state of the house its windows were embel-

lished with the vitrified histories and heraldic cognizances of its owners and their numerous alliances, but this beautiful portion of the decorative treatment has entirely disappeared.

The Hall, noted by Aubrey as "open and high, and windowes full of painted glasse," is in the most ancient part. It measures internally, and clear of the recesses at one end, 31 ft. 8 in. by 19 ft. 9 in. Out of this modest area a passage is to be deducted, and this reduces the length on the floor to about 25 ft., so that in less space than a good dining-room of the present day is presented a perfect mediæval hall, with no room above or beneath it. The time had evidently passed when the hall was the main abode or ordinary assembling place of the entire household, and yet further removed was the period when, except "a chamber for my lord and lady, all the rest lye in common—viz. the men servants in the hall, the women in a common room." At Wraxall there were appropriate apartments, and offices for all the requirements of the family and domestics. The hall served simply as a stately vestibule, and place of hospitable entertainment or occasional diversion. The floor was level with the ground, and the pavement probably of stone or tile. The walls rose about 20 ft. and the ridge was 12 ft. higher. The roof was formed in four bays with five principals, there being one next the wall at each end which is curiously sloped backwards for the purpose of relief. Each bay, being about 7 ft. in width, is again divided by half principals, and there are two purlins, therefore each

bay consists of six panels, surrounded by hollow mouldings in several facets; but the middle panels are the most perfect, and consist of an elongated quatrefoil in a pointed ellipse; and the angles of the rectangular panel are filled with cusped spandrels. The common rafters, 4 by 3 flatwise, are visible through these open panels; and rising above the ridge (placed diamond-wise) are framed together at the top. The chief ribs, at about half the height of the principal rafters, have the usual level strut. This timber is 11 by 9 in., but the curved pieces above are not so thick. There is a well-moulded four-centred arch 7½ in. thick, with no extraneous member, in the shape of label or hoodmould. These arches, set down upon carved brackets of careful design, with grotesque tops and corbel bases upon which, at a later time, have been affixed a series of shields. The massive wall plates, 12 by 6, come to the inner face, and are lined with a moulded cornice. On the side next the entrance court there is a gutter, and on the other the tiling is carried over the thickness of the wall by auxiliary foot rafters, and ends in dripping eaves.

Thus, in a roof of very moderate dimensions, is displayed a large amount of architectural character. A perfect accordance is maintained between the woodwork and the masonry; and although the latter is disturbed by the introduction of an Italianized chimney-piece, bearing the date A.D. 1598, the incongruity serves the useful purpose of proving, by a contrast of style, the correctness of the date attributed to the rest of the work. To other parts

of this attractive edifice I am debarred, by want of space, from more direct allusion, but must refer to an admirably illustrated account by A. W. Pugin and T. L. Walker. London: Bohn, 1840.

In the same carefully prepared volume will be found examples of roof principals very similar to those at South Wraxall, save in the absence of the elaborate brackets upon which the arches rest. At the Vicars College, in Wells, the arches either abut upon the walls or plates, without any terminating feature, or are rounded off, or, again, are finished with brackets of very simple form, and small projection. These are the accounted work of Thomas de Beckington, a disciple of Bishop Wykeham. While at the college in Winchester, Beckington attracted the notice of its founder, and having distinguished himself, was sent to New College, Oxford, where he became fellow in 1408. He was tutor to Henry VI., and consecrated Bishop of Bath and Wells A.D. 1443, a dignity he held till his death in 1464-5. In these last mentioned buildings, there are floors and ceilings, but so far as concerns the roofs, the arch, though not in fact of much structural use, as here applied, was evidently felt to be the correct auxiliary for framed principal ribs. It is further clear that when imposts for these arches were deemed requisite, an admitted and approved form was that of the bracket or corbel.

CHAPTER VIII.

CROYDON.

UNDER the present highly-improved condition of the country, with the ease of modern travelling and almost magical postal services, it is difficult to appreciate the reason of so many residences as some prelates maintained; but they were thus enabled to dispense an enlarged hospitality, to promote the personal correspondence of bishop and clergy, and keep up an efficient supervision. Croydon has been a place with some population from the earliest times, as shown by the *tumuli*, the circular encampment, and the Roman road in the vicinity. The memorable events are few, but in 1264 the Londoners who had sided with the barons were attacked here by the army of Henry III. and routed with great slaughter. In 1236, William, son of Earl Warren, was killed in a tournament. On May 25, 1551, a considerable earthquake was experienced; and the place was several times visited by the plague in the seventeenth century.

William I. gave the manor to Langfranc, but the patronage of the church remained in the Crown till 1351, when Archbishop Stratford became rector. A palace, though perhaps of moderate size and perishable materials, existed in the

thirteenth century, but was probably of much earlier origin. Proximity to London must have made it convenient, but it never became a favourite abode like Charing or Mayfield. Still, it must have been a stately mansion, arranged about a quadrangular court, with the principal gate on the north and the hall on the south. There appears to have been a moat, and that method of fortification was rarely omitted where a supply of water could be had. The palace, with servants' apartments, stables, gardens, courtyards, and fishponds, contained nearly nine acres, and there was some appurtenant meadow. It was in such a house that the accomplished ecclesiastic and antiquary, Archbishop Parker, the first Protestant holder of the see, after narrowly escaping the flames in the previous reign, entertained Queen Elizabeth for a whole week in July, 1575.

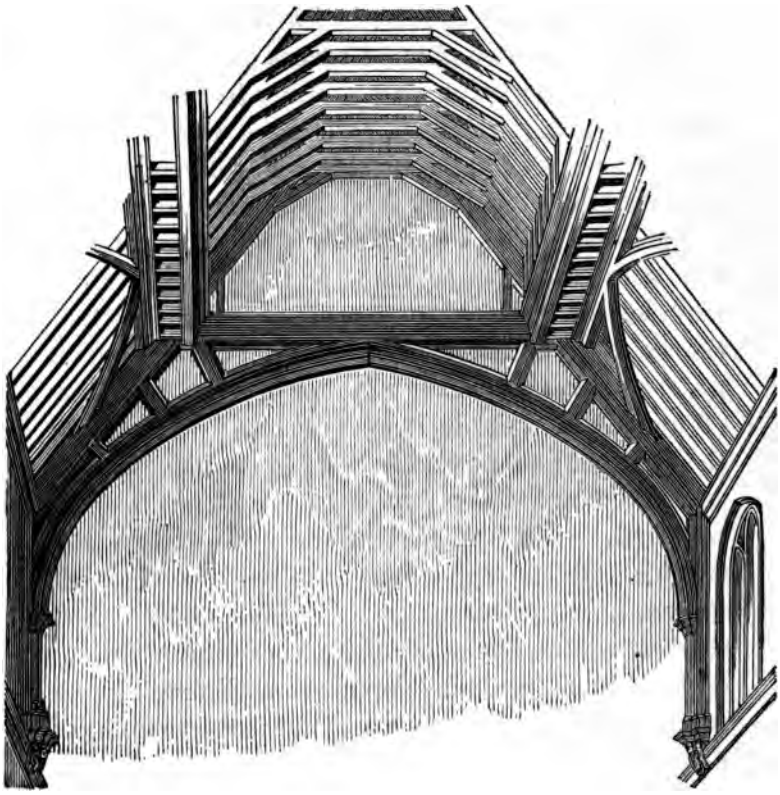
Upon the melancholy end of Laud, the Parliament let the palace on lease to lay tenants; but it was recovered by the see at the Restoration, and inhabited till the death of Dr. Herring, in 1757, when it was deserted. Archbishop Cornwallis obtained an Act in 1780 for alienating the property and building a new palace in some more eligible situation with the proceeds, augmented by other funds, inclusive of sums received for dilapidations, and from the Commissioners for building Westminster Bridge, by way of compensation for the prejudicial effect of that structure on the tolls of the Horseferry from Lambeth to Millbank. The building project was relinquished in favour of the

purchase of Addington Park, near Croydon, authorised by an Act in 1807, and that seat has since been the country residence of the Archbishops. Croydon Palace, after the sale, was used for a manufactory, and the venerable edifice has been necessarily injured and disfigured; but the parts that remain have from the very circumstance of their jeopardy been invested with additional interest.

Dr. Ducarel considered the oldest parts of the palace, which are evidently those of brick, to be of the time of Henry VI. The hall was in the clear of the walls, 56 ft. long and 37 ft. 9 in. wide, divided into four bays, with as many windows on the south side. At the eastern bay of the north side is a vaulted porch some 15 ft. square, which at some time had a room above with a chimney in one angle. The porch was the principal entrance, and opposite to it was a door into the gardens. Three arched doors in the east wall led to the buttery, kitchen, and cellar. All these doors were shut off by a screen, with a gallery above, but no part of it remains. At the end, above the screen, was a lofty window, but this has also been removed. At a later period, there was in the place of the window a somewhat remarkable piece of sculpture, consisting of angels, royally draped, supporting a shield, and protected by a projecting canopy in the form of a bed-tester and valance. The arms are of England and France quarterly, impaled with those of Edward the Confessor. This ornament is considered of the same age as the hall, with the cornice of which the mouldings exactly coincide.

The arms are attributed to Henry VI., and are presumed to have been put up by John Stafford, Archbishop 1443-52, the assumed builder of the hall. This opinion is supported by the occurrence of his arms on shields in the moulded string-course that surrounds the hall at about 15 ft. from the floor. His bearings are given singly—impaled with the see of Canterbury—impaled with Bath and Wells, his previous diocese. In this series of shields occur also the arms of Humphry, Earl of Stafford, created Duke of Buckingham in 1444, and other noblemen. Those of Archbishops who followed Stafford were introduced from time to time. This string-course, ornamented with shields and the projecting corbels for the roof, formed an effective band, below which the wall was solid and unbroken except by the doors.

The design of the roof was grand and simple, laying open the full capacity of the interior, and imparting a character to the hall impressively noble. There are three perfect ribs, and half-principals are attached to the end walls. They have finely-curved four-centred arches, with a rise for the intrados of 13 ft. 10 in. These arches spring from the capitals of shafts, whose bases rest on the corbels already mentioned as connected with the string-course, similarly to those at Westminster. The constructive theory is well maintained; the arches are true moulded ribs, and they do not touch the principal rafters, but there are radiating struts from one to the other, dividing the spandrels into voussoir-like compartments. Crossing the



HALL ROOF, CROYDON PALACE.

roof at the crown of the arch is the usual level strut, in this instance wrought into fine mouldings, which, being mitred to those of the longitudinal purlins, form a kind of open panel in each bay. The purlins are not in contact with either the chief or common rafters, but give support to the latter by means of horizontal and upright spars. Higher up each pair of common rafters has a level strut and inclined supporters, as at Nursted Court. The rafters meet and are framed together at the top, without

a ridge. The walls are finished with a bold cornice, and there are arched wind-braces on the slope of the roof in the lower part. Many features of the Early style are retained, and there was a louvre over the place of the central hearth till removed in the alterations made by Archbishop Herring.

Episcopal palaces constitute a valuable class of our domestic architecture: and in their variety may be seen the dissimilar characters of distant times. Croydon, for ages a home of the English primates, was advisedly abandoned; and in favour of unmarked portions it would be as idle to utter the shortest plea as to ask that scores of buildings whose appointed services are past should be perpetuated. But the hall of Croydon Palace has notable and sterling merits; it displays vigorous design, bold execution, and dignified effect. The roof is an example of British carpentry in its highest structural development, and few objects could more properly attract the conservators of national monuments than this stately and venerable apartment.

This roof, I should not omit to state, is reputed to be of chestnut wood, and from a comparison of the qualities of this timber with other most valued sorts, there is much cause to regret the gradual disappearance of so admirable a material. In any such view, however, it has to be recollected that for building purposes our native products have almost exclusively given way to importations; but in earlier times it must have been entitled to high esteem. It is the sweet or Spanish chestnut

(botanically *Fagus Castanea*), an Asiatic tree of ornamental growth, said to have been introduced into Europe by the Emperor Tiberius, and to have spread rapidly in the southern parts of the Continent, especially in volcanic districts ; the largest representative of the species being the *Castagno de cento cavalli*, on Mount Etna. It thrives also in this country, and there are authenticated instances of its attaining a very large size. A forest of chestnut, according to Fitzstephen, who wrote in the twelfth century, once existed on the north of London, and the wood appears to have been in very general use by early builders. In colour and appearance it resembles oak, but may be distinguished by the absence of transverse septa, or silver grain, that gives to oak its peculiar flower or figure when cut into boards. Chestnut grows more rapidly, has a smaller proportion of sapwood, and is for some uses, of greater durability than oak. It also exceeds the latter in toughness, but is scarcely so strong, and in stiffness decidedly inferior.

CHAPTER IX.

ELTHAM PALACE.

In an endeavour to approach the localities, dates, and destinations of these examples and memorials, occasional glances at the persons connected with their origin and course, as well as the habits of their time, are almost inevitable. We gather information at once as to the place, period, authors, and purposes of a building; its precise configuration and principles of construction. Some of these may be held subordinate, and to be valued only for the light they cast, as by reflection, on the general subject; but none can be utterly ignored. Inference is a chief support of architectural history.

Eltham, anciently Ealdham, (the old mansion or dwelling, as Lysons explains), is situated about eight miles from London, on the Maidstone road. It was a royal manor held by one Alwold under Edward the Confessor. William the Conqueror gave it to his half-brother, Odo, upon whom he also conferred the title of Earl of Kent, previously borne by Godwin, the father of Harold. When Odo was banished in the next reign, about four years after Doomsday Book had been compiled, it reverted with his other possessions to the Crown. Henry III. kept Christmas here with great state in 1270. The manor was afterwards divided by Edward I. There were three parks—namely, the

Great Park, of 596 acres; the Little or Middle Park, of 333; and the Horne or Lee Park, of 336 acres. One consequence of this division is a somewhat confused history of the place; but it seems probable that some part was always in the Crown, notwithstanding the tenure of a portion by Baron Mandeville and another by John de Vesci. It was with the De Vesci property that the celebrated Anthony de Bek, Bishop of Durham, became connected. Bek was not a churchman only, but a distinguished warrior, in which latter capacity he led the van of the King's army into Scotland, where in the course of the campaign De Vesci fell, and in dying made the Bishop trustee of his estates. Bek sold Alnwick Castle to Henry de Percy, and retained Eltham, which he converted into a favourite residence, and died there in 1311. The splendour of his establishments was inferior to the King's alone. He maintained 140 knights, and had fair claims to be termed munificent. He founded colleges at Chester and Lanchester, erected towers at Gainford and Coniscliff, castles at Auckland in Durham, and Somerton in Lincolnshire, and Durham-place in London.

From Bek the palace passed to Queen Isabella, and here her son Prince John was born in 1315. Edward III. twice held Parliaments at this palace, and gave a sumptuous entertainment to King John of France. A royal banquet was given by Richard II. to the exiled King of Armenia. Eltham seems, in short, to have been in favour with its regal owners till Henry VIII. gave preference to Green-

wich. Elizabeth spent a few days here in 1559, and James I. made the last kingly visit to the place in 1612. The churchwardens "Paid for ryngers when the kynge's magestie came to lie at Ealthom, 12d." Prince Frederick of Wales was created Earl of Eltham in 1726.

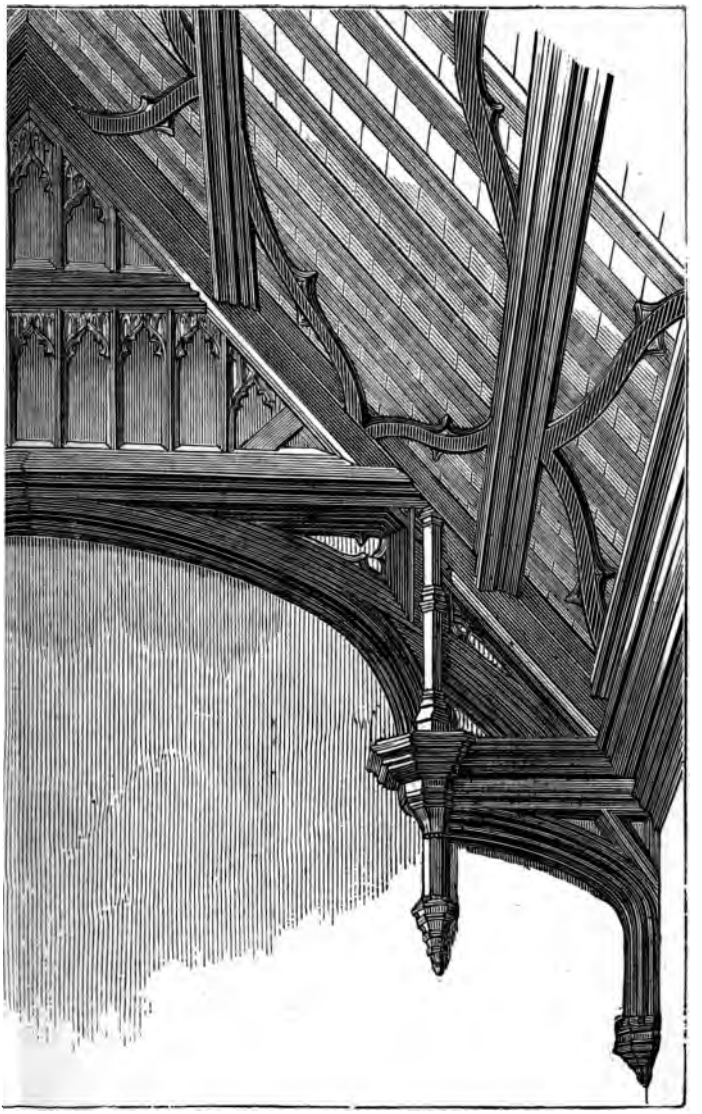
During the Commonwealth, the palace, already unfurnished and out of repair, was valued at £2753, clear of the cost of taking down, and sold; but the hall escaped demolition through its fitness for a barn, and to that purpose it was long applied. The sales of royal property were annulled at the Restoration, and Eltham was regained by the crown.

The Perpendicular style of Gothic architecture (to which the present example belongs) flourished under some of the most extravagant possessors of the English throne. It commenced with Richard II. and was in full vigour under Edward IV. The treatment of stonework had become elaborate, refined, and elegant; and it was by no means unnatural that the masons, by whom so great a result had been promoted, should in times of general parade be tinctured with prevailing arrogance. Their correspondence with the Continent, and the probable, if not necessary, infusion into their ranks of foreign recruits—above all, their pretension to mysticism and secresy—must have been obnoxious amid the political conditions bequeathed by Henry V., together with his crown, bringing masons, as it were, within the bane of

> "Conjurors and sorcerers, that afraid of him,
> By magic verses have contrived his end."

THE HALL AT

(To follo



ELTHAM PALACE.

(w page 72.)

Their lodges, or confederacies, were accordingly prohibited by an Act, 3rd Hen. VI. (1425). But we may perceive an indication here that the most advanced phases of the building arts had become sufficiently naturalised to be independent of extraneous support; and that carpentry, placed upon a footing of unprecedented eminence by the masterpiece of Westminster Hall, had obtained a high artistic recognition. It must have been felt that a period had arrived at which architecture could be released from thraldom to a craft, made free of every material, and instead of continuing the slave of one, become the equal patroness of all. The most elaborate and intricate examples of masonry were executed after the holding of lodges had been made culpable; but the presence of timber had become agreeable where stone at an earlier date would have been deemed indispensable. Stone vaulting, as seen not solely in great ecclesiastical monuments, but in the occasional embellishment of secular works—take as instances the ceilings of bays and oriels—is thoroughly beautiful. Those at Eltham fully bear this out, save that one has been sadly injured to allow the passage of waggons. But this sensation is largely dependent both on fineness of detail and the upturned direction of the eye. Plain vaulting at a small height is cold, depressing, and cheerless, but becomes airy and pleasing at a great elevation.

The hall is on a very perfect plan, and of fine proportion, being in length 101 ft., in width 36 ft. 3 in., and in height about 55 ft. The length is re-

lieved by the recessed bays or severies at the west, and the screen and gallery at the east. There are five other bays on each side, separated externally by buttresses. In every bay is a pair of two-light windows, connected by the hoodmould or label being carried horizontally across the dividing pier at the springing. The double cusped tracery of their heads is exceedingly elegant. The windows are raised above a string moulding, as at Westminster and Croydon—a circumstance not observable in some early examples, but one that was calculated to give repose and dignity to the interior, as well as to display the heraldic charges with effect. The walls are of Kentish rag below the windows, and of Ryegate ashlar above.

For the roof, the length is also divided into six parts, with seven principal ribs, resting on stone corbels, bonded into the masonry. There is some assimilation of design to the roof at Westminster, but an immense inferiority in sustaining power and equilibration. The flattened arch is not only essentially weaker in form, throwing an augmented stress upon the upper part of the walls, but here it does not assume the actual office of a chief bearer, so much as apparently that of a preserver of normal conditions. Homage was done to the figure of the arch as a constructive accompaniment, when it was no longer regarded as a practical necessity. It is, in fact, the artistic line by which a series of separate and immaterial struts are governed and connected. The arch, cut into parts, while the members that cross it, though secondary features of the

design, are entire, imparts complexity and richness, but is of no essential utility. The hall generally has been admirably represented, and the framing of the roof most carefully dissected and illustrated, by Messrs. Dunnage and Lavers; so that with all the details thus openly revealed, the architect can readily trace the intentions of the mediæval craftsmen.

The side walls are not raised very much above the heads of the windows, and the timber work commences with a plate 12 in. by 18, in two parts, each 9 in. thick. Caulked down and pinned upon these plates are beams 16 in. by 12, projecting inwards 6 ft. 9 in. Upright posts rise from the stone corbels already spoken of. To these projecting beams and framed into both are curved pieces, forming an elliptic quadrant or half arch, to serve as a bracket. To the inner end of this short beam is framed the queen post. From the wall end of the same beam rises the principal rafter. Midway up these principals occurs the usual horizontal beam, and this is prevented from sagging by a four-centred arch springing from the brackets. The mode in which the horizontal beams are framed into the principals shows that they were regarded as struts, and not as ties. But it is obvious that a strong timber, securely framed into others at its ends, is equally suited to resist extension and compression. A piece intended as a strut may consequently, under some change of structure, serve the purpose of a tie, and this reverse of purpose has no doubt often taken place in old roofs. The errors of contrivance

may be counteracted by the inherent strength of large frames of woodwork based on no very direct agreement with the laws of stress. Whenever it is found that pins and tenons have given way, it may be suspected that some unlooked-for power has been exerted, as pins and tenons could never have been rightly applied, if tension were presupposed.

It is difficult to describe a roof so deficient in simple perspicuous principle as this of Eltham—a defect that time has severely exposed. The trusses are said to contain a larger proportionate quantity of material than those of Westminster. Yet, with its constructive demerits admitted in full, there are few examples with more of elegance to disarm criticism and invite admiration. The original beauty of the pendents has been much impaired by the loss of the small pinnacles and perforated panels with which the central posts were encased, but a record of their design has been preserved, and they are not the less interesting from similarity to the later work at Christ Church College, Oxford. The workmanship of the entire roof is admirable, and the timber of remarkably clean and superior quality. The scantlings are so free from sap and knots that Messrs. Dunnage and Lavers concluded that they must have been cut from oak logs of great size; but such qualities agree so closely with those of chestnut discussed in the last chapter, that I should be disposed, upon the evidence before me, to assign it to that species. Pugin remarks that of those who examined the material during certain repairs, some deemed it of one kind, some of the other. It is quite

possible that woods so alike in their properties and appearance may have been jointly employed or introduced without distinction in repairs. Foreign oak is often of straighter and finer grain than our "unwedgable and gnarled" variety. Chestnut has a whiter sap and browner heart, and the pores of the alburnum (which, in oak, are open and frequent), are so minute as to be hardly observable without glasses.* Belidor says it soon rots when built into a wall, and suggests that the ends of joists should therefore be left free.

It is observable that the ends of the principals at Eltham were most affected by decay, though this may have been accelerated by the imperfect condition of the gutters. With the information now at command on the subject, a moderate power of discrimination ought to suffice for setting the question at rest.

Another point has been mooted touching the fastenings employed, and the fact seems to be that in the skeleton framing wooden pins were exclusively employed, but iron nails were used for attaching to the main timbers the mouldings which had been separately wrought. The forging of nails that now forms a gigantic branch of industry, and has no doubt exerted a considerable influence on the system of carpentry, was then but little followed in this country, and those used at Eltham were probably foreign. "Among the list of articles, the importation of which was prohibited in Edward

* Sir H. Davy, "Agric. Chem."

IV.'s reign, with a view to the protection of domestic manufactures, we find no mention of iron, which was still, as a matter of necessity, allowed to come freely from abroad."*

The badges of Edward IV. among the ornaments, the general character, and known events, serve to connect this erection with his reign.† His residence here in 1480 is marked by the birth of Princess Bridget, who became a nun at Dartmouth, and the festive celebration of Christmas,—the Feast of the Nativity—in 1481,‡ when 2000 persons were daily entertained, may have been intended also to commemorate the recent completion of this stately and sumptuous apartment.

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* Smiles' "Indust. Biog." In Smith's "Antiquities of Westminster," an entry is recorded of 100 nails, called spikyng for the scaffold, 10*d* ; and of fish-sounds for glue.

† "His buildings were few, but sumptuous for that time,—or rather, Reparations, which are yet to be seen at the Tower of London, his House at Eltham, the castles of Nottingham and Dover, but above all at Windsor, where he built the new chappel, finished after by Sir Reginald Bray, Knight of the Order."—*Kennet's Hist. Eng.*

‡ In Pugin's "Examples of Gothic Architecture" this date is erroneously given as 1483.

CHAPTER X.

KING'S COLLEGE, CAMBRIDGE.

As a landmark in the history of style and construction King's College chapel has especial eminence, and very explicit information concerning it exists. The chapel is part of a royal scheme that, if carried into effect, would have presented the most sumptuous set of buildings of the kind in England. It is remarkable that at a period when the tenure of the throne was precarious, architecture should have been so zealously studied, should have attained to such astonishing perfection, and have received such munificent encouragement. In this, the portion only of a vast but unfulfilled design, we see at once the great mediæval gem of Cambridge, and the most exquisite example of masonry in the kingdom.

The scope of the founder's purpose may be seen in its dimensions, but these could hardly be expected from the mere designation of a College Chapel. Externally the length is 316 ft., the breadth 84 ft., the height of the side walls 90 ft., and of the towers 164 ft.

In regularity it may almost vie with the Parthenon itself; the sides are so uniform, and the ends are varied only by the magnificent door at the west. The buttresses have a projection of about 22 ft. at the base, but the effect is softened by a series of chapels in their lower stage, and the thrust of the

grand vault for which so large a space was necessary, is further counteracted by the weight of the walls, which, with that object, are carried far above.

The dates connected with this building are exactly kept from the commencement of the foundations by Henry VI., upon the festival of S. James, 1446. Grants were made by the King, of quarries at Thelfdale, Heselwode, and Huddlestone in Yorkshire, together with funds out of his Duchy of Lancaster. In the fourteen following years the work is supposed to have made considerable progress, but it was entirely stopped upon the proclamation of Edward IV. (5th March, 1460), who seized the revenues of the College; and though he restored a part for the maintenance of the provost and scholars, allowed nothing from the Duchy towards the building. The work stood still for nineteen years, when Dr. Field, warden of Manchester College, was chosen provost of this house, and appointed overseer of the works by the King. The building went languidly on under this monarch and Richard III. Nor was it prosecuted with any considerable vigour till late in the reign of Henry VII., when it was taken up in earnest, and funds for its completion provided, so that in A.D. 1515, the 7th of Henry VIII., the *case* of the Chapel was finished. The provost and scholars, under the advice of the King's executors or their deputies, were to "vawte the churche of the saide College after the fourme of a platte therefor devised." The stone used (and in these days such information has its use) though partly from Hampole, in York-

shire, and Clyptham, in Rutland, was chiefly from Weldon, in Northamptonshire.

Timber for the scaffolding and for the outer roof was also given by Henry VII., and partly obtained from Catlige, in Cambridgeshire, and several other places, but principally Wethersfield Park, in Essex, the overseer of the works being Thomas Larke, King's Chaplain, afterwards Archdeacon of Norwich. The delays were altogether so great that the reign of Henry VIII. was well advanced before this Chapel was completed, the contract for the glazing providing that it should be "after y^{e} fourme, manner, goodnesse, curyousytie, and clenelyness in every poynt of y^{e} glasse wyndowes of y^{e} kynges new chapel at Westmynster."

Through such delays the advantage of a gift of some interest to the campanologist and antiquary was eventually lost. It was intended that a lofty tower should be erected on the western side of the cloister to contain a peal of bells, and Pope Calixtus III. had five cast and sent as a present to the College in 1456; but the temporary frame in which they were hung having decayed, they were laid within the chapel, and proving an encumbrance, were sold about the middle of last century.

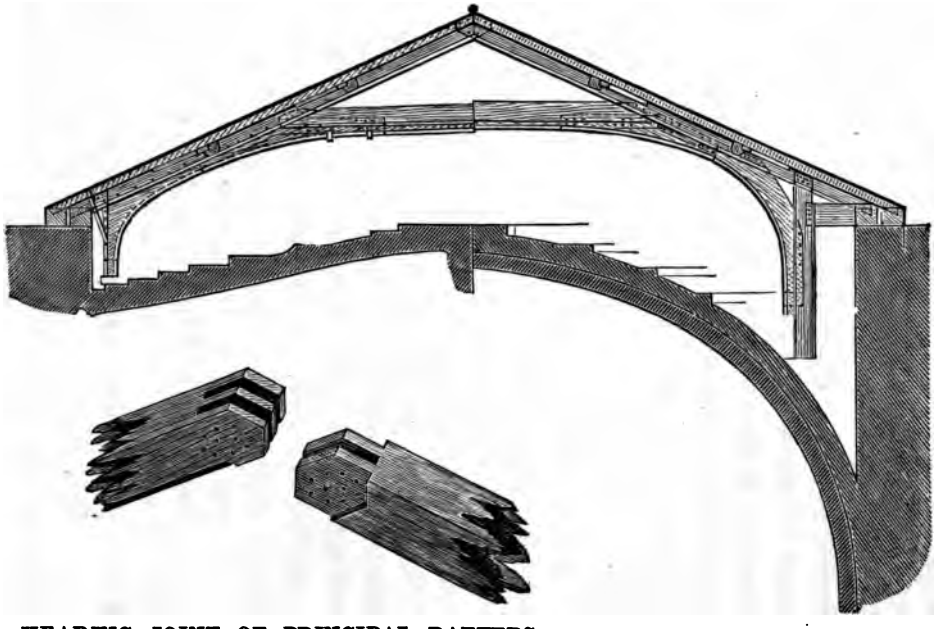
The mechanical and decorative principles of the vaulting are distinct, are equally marked by the highest talent, and together form a triumphant combination of science and art power. Constructively, the vault is reducible to a series of chief and secondary vertical ribs, connected and confirmed by others, horizontal and concentric. The tracery

is not produced by general abatement from a single surface, but the ground of each panel consists of a slab laid between the rebated edges of the ribs, just as the panels of joinery are of thinner boards than the styles and rails. It is said in Malden's account, 1769, "This roof is so constructed that it has no dependence on the walls between buttress and buttress, on either side, or between tower and tower at either end of the chapel, the whole weight of the roof being so supported by the buttresses and towers that if the above-mentioned walls should be entirely taken away, the buttresses and towers alone remaining, the roof would still continue as firm as it is at this hour." In a purely mathematical view some grounds for this statement may be discovered, but in a practical sense it goes beyond the limit of stability the projectors believed and provided for.

Above the wondrous masonry of these consummate masters was placed the upper and outer roof, a minor emanation, it may be fairly supposed, of the same profound intelligence.

Premising that the clear space between walls is 40 ft., I shall adopt the description given in Lockwood's edition of "Tredgold":—"The timber roof is built entirely of chestnut, and is framed with a truss over each pier, and one over each window. The truss over the pier rests on a stone projection in the spandrel of the vault, built out from the wall, which would otherwise be weak at this point, being against the passage. Against this projection is placed a post, supporting the principal rafter above, and cut with a projecting

ROOF OF KING'S COLLEGE CHAPEL, CAMBRIDGE.



HEADING JOINT OF PRINCIPAL RAFTERS.

curb towards the lower part to receive a curved bracket, the back of which, at the lower end, is tongued into the post, and at the upper end into the principal rafter, and fastened with wooden pins, as are all the joints throughout. Between this bracket and the collar-beam (which is cut in a bent form), is another piece, also curved. This piece is secured to the principal rafter and to the collar-beam (which is cut with an abutment to receive it by a key inserted into the three); and this piece, the bracket and the collar-beam together, form an arch. An inter-tie, resting on the wall, is fixed to the back of the post, and receives the foot of the principal rafter. Between the trusses and tongued into the inter-ties are double wall plates. The inner one supports the foot of the principal rafter of the truss over the window, and the outer one receives the common rafters. Between the principal rafters and tongued into them, and rabbeted on to the back of the purlins, are boards, cut in the form of arches (wind braces?). The truss over the window has no inter-tie, and the post stands against the wall, instead of against a projecting pier. In all other respects it is framed in the same manner as the other truss, but the collar-beam is rather lower. Under the foot of the common rafters, on each side of the tenon, and stretching partly over the inner wall plate, is a small piece of wood, raising the foot of the rafter about $1\frac{1}{2}$ in. above the wall plate, the intention of which could not be ascertained, as its enclosed situation precluded the possibility of examining it. There has

recently been a block fixed on to the inner wall plate behind the foot of each common rafter, which is omitted in the engravings. In the section some iron straps are shown, but they are only partial, and should also have been omitted, being no part of the original work, in which no iron or nails were used. The timbers are very heavy, but by means of the posts and brackets the pressure is thrown as low down the wall as the stone roof will allow."

From these particulars and the form of the woodwork, it may be concluded that one principle guided the design of the inner and outer coverings. The walls and buttresses, opposed to the stress of the vaulting, were deemed sufficient for the thrust of the roof also. But the situation of the wall posts would seem to indicate a purpose of concentrating the weight of the outer covering in aid of the buttresses, where the pressure of the masonry was greatest. Besides affording protection from the weather and convenience of access for repairs, the raised outer roof may have had less obvious services to perform, and its relation to the vaulting should always be borne in mind. The care with which its members were wrought makes it probable that it was fixed earlier than the vaulting, and not intended *ad interim* to be unseen.

An example of the heading joint of the great rafters, which are about sixteen inches square, is given in the margin, and there being no ridge, the common rafters were framed and pinned at the top. They are 8 in. by 6 in., and have a bearing from purlin to purlin of about 8 ft.

CHAPTER XI.

CROSBY HALL.

In the fifteenth century London's fashion, equally with commerce, had its centre in the City. There, too, the religious orders were most numerously represented; and at Bishopsgate, whose dense population is now so active in secular pursuits, dwelt the pale Sisterhood of S. Helen's Priory.

Among the hereditaments of that establishment was a great tenement held by Cataneo Pinelli, a Genoese merchant. In 1466, Dame Alicia Ashfelde, prioress, granted a lease of that tenement for ninety-nine years to John Crosby, already, it may be presumed, a wealthy citizen. It is noticeable, indeed, that although the times were perturbed by two antagonistic kings, like rival suns, alternately in lustre and eclipse, commerce was steadily pursued, and social conditions were improved.

The prioress of S. Helen's had in her new tenant a type of the civic magnate of the period. Assiduous in municipal affairs, he served the offices of alderman, sheriff, warden of the Grocers' Company, and mayor of the staple of Calais. He was a pronounced politician of the Yorkist party, and member of Parliament for the City in 1461, when Edward IV. was proclaimed. He attracted Edward's favour, and, in 1471, received the honour of knighthood. Henry VI. died that year in the Tower, where much of his life had been spent, partly as a sovereign

prince and partly as a prisoner of war. It was, however, the tenth regnal year of his successor.

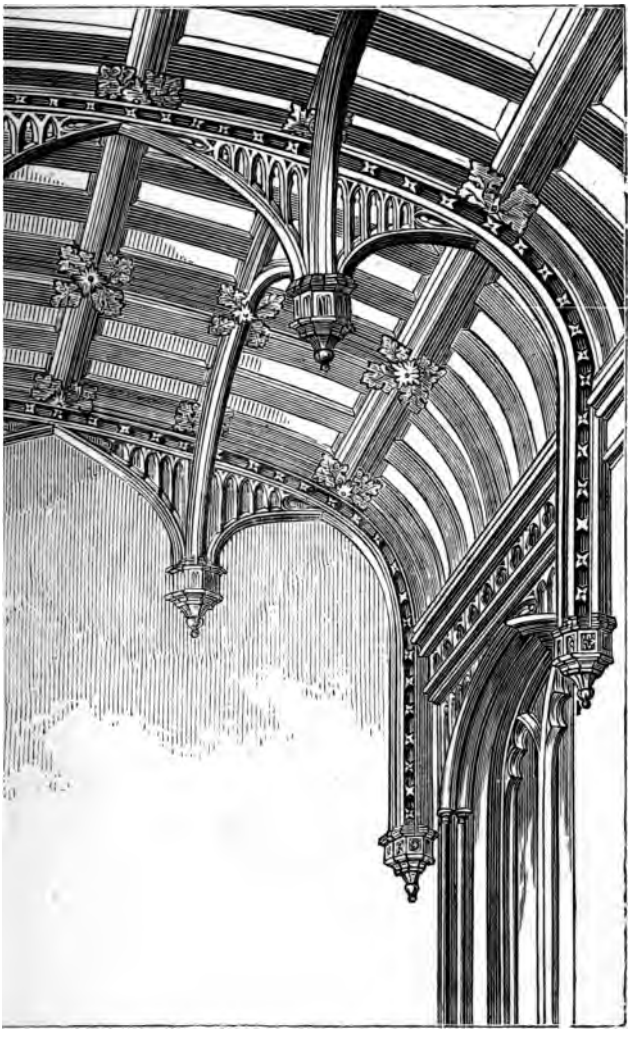
Soon after obtaining his lease from the Priory, Crosby demolished the former residence, and built a very perfect mansion, with state and ordinary apartments, chapel, domestic offices, stables, bowling-green, grass-plots, pleasance, and garden. The remains were investigated some years ago by Mr. John Woody Papworth, architect, (a late earnest and accomplished artist) to whose drawings the medal of the R.I.B.A. was awarded, and his plan was published among the illustrations of Mr. H. J. Hammon's work, produced in 1844. Much of the plan thus made public consists of restorations to suit the actual remains; but the hall and some adjacent rooms have never been entirely lost, though for a long period subject to most lamentable neglect and dilapidation. As Sir John died in 1475, the date of his erection is determined with more than usual precision; and the after-history of the place, embracing its associations with Sir Thomas More, Shakspearian Richard (the poet himself is supposed to have lived near), with monastic surrenders to the Crown, and a long line of notables has sustained the interest so admirable an edifice was calculated to originate, and of which two centuries of degradation did not preclude the revival.

The architecture of Crosby Hall has some remarkable analogies to the buildings described in our two last chapters. The dimensions within the walls are about 56 ft. by 26 ft.; but it is in size, rather than any other quality, inferior to its con-

temporary at Eltham. These buildings are by no means of identical design, yet there are such striking points of resemblance in style and detail as to induce a supposition that they were produced by the same architect. The two-light windows have heads of very similar curvature, and the label mouldings are continued horizontally across the piers; but instead of two windows to a severy, as at Eltham, there is here but one. The windows are only 7 ft. from centre to centre, and their inner jambs are shafted and ornamented with arch mouldings, so that the plain wall pier is merely wide enough to admit the stone corbels (of octagonal plan, with hollow sides, panelled and battlemented), from which spring the ribs of the roof. The length of the hall is divided into eight severies with nine chief ribs, since the general rule was followed by which the timber work is kept free from dependence on the end walls, and the latter simply perform the office of enclosures. The manner in which the side walls are terminated internally is exceedingly ornamental and perfect. The bold stone corbels before spoken of finish at the springing of the window arches. The surface from springing to crown has spandrels with narrow trefoil-headed panels. Above the spandrels a fine band of quatrefoils in squares, with central bosses between the cusps, extends the whole length, and is surmounted by an effective capping, whose upper member is notched into battlements. Below the sills of the windows there is no string-course, but the plain face of the wall was intended for the

THE ROOF O

(To follo



SBY HALL.

88.)

display of tapestry hangings or other graphic decorations. A fine octagonal bay window on the west side, and more centrally placed than usual, is the whole height of the wall, the lights being in three stages with battlemented transoms, and the head finished with delicately-moulded rib groining.

I dwell minutely on the features of this hall, and its intrinsic merit would amply justify particular description; but there is a peculiarity not commonly recognised—the thoroughly masonic design that pervades alike the stone and wood, though each material is distinctively and appropriately treated.

Comparison may now be removed to King's College Chapel, which illustrates an attempt by the mason to throw a ceiling of stone over the entire internal area by a method varying in some respects from the groining of older date, the leading distinction in form being the four-centred or pointed elliptic arch of the great cross ribs that perform the same office as timber principals in carpentry. Stone ribs usually spring from vaulting-shafts that rise specially from the base of the wall; but for those of timber the usual support is a corbel or bracket. In such a parallel it will be admissible to allude to the roof or ceiling of the Divinity School at Oxford —a work of the same age, and displaying in eccentric combination main cross-ribs with perforated backing, fan-groining, pendants and panelled tracery. The design of the Crosby Hall roof appears to be made up of the arched ceiling of the Cambridge Chapel and the longitudinal lines of arches and pendants met with at the Oxford school.

Without so close a resemblance as could be termed servile, there is just such a relationship as may indicate the inductive path of artistic invention.

Mr. Hammon gives a very clear and graceful view of this ceiling or inner roof. There is no attempt at groining, but the waggon vault with its chief and secondary ribs, its longitudinal purlins, traceried arches, carved pendants, and mitre bosses —even the mouldings and flowered hollows—make the notion irrepressible that the designer was not unused to ornamental stonework. The planks that seem to occupy the place of rafters follow the curve of the cross-ribs and have hollows on the edges, and the space between them is filled by thinner boards, producing an uniformly broken surface of suitable character and richness.

In addition to the Great Hall, there are other apartments whose ornamentation is of much elegance, and in its early perfection the grace and finish of Crosby Place must have shed dignity upon the assemblages for stately council or festive entertainment it no doubt frequently contained.

Looking also to the ascribed direction of its origin, there may be perceived something more than happy chance—a character of restitution—in the adoption by the late Mr. Wilkins of this work as a model for the new hall of King's College, Cambridge, where, under the shadow of that noble masonry to which its conception is so clearly traceable, and where, apparently more indigenous than in its metropolitan nativity, this admirable design has entered a revivified and appropriate career.

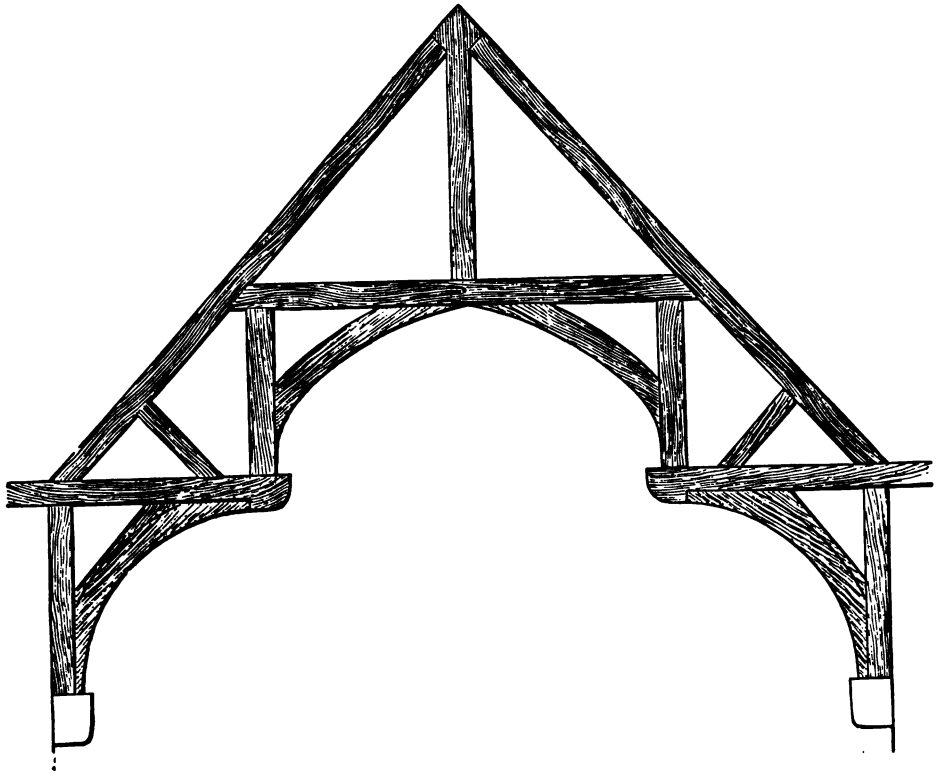
CHAPTER XII.

BRACKET ROOFS.

As Westminster Hall affords the chief example of arch ribs, so Westminster School is perhaps the best representative of a very numerous class which I need not hesitate to call the BRACKET ROOF.

The history of this piece of carpentry is involved in that of the place, and Westminster has been a seat of education from remote times. Ingulphus, son of an officer in Edward the Confessor's court, was engaged as secretary by William of Normandy when he visited the English king. After the Conquest Ingulphus was made Abbot of Croyland, and he tells how for the attainment of learning he was put to Westminster School. Fitzstephen, secretary to Thomas à Becket, has left a record from which Stow concludes the principal schools of the metropolis to have been at S. Paul's, Westminster, and Bermondsey Abbey.

Very different from the present was the Westminster School of monastic ages:—"In the north cloister sate the prior, and in the western sate the master of the novices with his disciples." At the Reformation the institution passed at once into a new stage. The Abbot was converted into a Dean, and the monks were succeeded by prebendaries. In the new organisation a school was founded here, as at Canterbury and other places, but the eccle-



ROOF OF WESTMINSTER SCHOOL.

siastical element was long intimately blended with the scholastic. "Of all the schools which the princes of the Reformation planted in the heart of the cathedrals of England, Westminster is the only one which adequately rose to the expectation of the Royal founders." The benefits to literature and intelligence may fairly, however, be weighed against the architectural prodigies which adorned the ages before. But a new form of scholastic government did not demand new buildings, and an apartment of the abbatial edifice had only to be converted. The school-room still covers the same space, and its walls are inscribed with famous names, which in long hereditary descent rival probably any place of education in England. Its roof is of the thirteenth century—one of its windows of the eleventh. Such, at least, appears the impression of Dean Stanley, who has so appropriately included notes on the school (to which I am here indebted) in the historical memoirs of his church. "The traces of Westminster boys," he says, "who have played in its cloisters and inscribed their names on its walls, belong to the story of the Abbey, no less than its venerable beauty, its solemn services, and its lofty aspirations."

Great men have been masters—Camden, Busby, Vincent Bourne, and Jordan. Greater men have been scholars—Ben Jonson, Cowley, Dryden, Prior, Cowper, Southey, Gibbon, Earl Russell, and if I speak doubtingly of John Nash, at least one great architect—Sir Christopher Wren.

As to the age of the roof, a dormitory erected

by Abbot Litlington in the reign of Edward III. was appropriated to the school at the Reformation, and the original roof may have been preserved. It would thus be carried back to the fourteenth not the thirteenth century; but under a belief that no bracket roofs are anterior to Westminster Hall, I think they would be more correctly assigned to the fifteenth. The thick Norman walls were fully capable of supporting the untied roofs, and the thrust was uniformly deposited at short intervals when each pair of rafters bore its proper share of the weight; but when lighter, though more compact, walls of brickwork came into use, and the system of concentrating the pressure by purlins and principals obtained, some expedient for increased security became desirable. The machine called a crane, commonly used in building and commercial operations for hoisting weights, indicated the exact object required. The crane consists of a projecting beam at the top, called the jib, an upright post or standard, and an oblique connecting piece called the spur. The triangular figure of this machine imparts to it very great strength. In application to roofs, the jib is placed at the top of the wall, with the direction of which it forms a right angle. The post stands against the wall upon a projecting corbel, and sustains the oblique pressure of the spur. The jib being laid across the wall, receives at its outer end the foot of the principal rafter, which acts as a weight or fastener. Upon the inner end of the jib is raised a vertical queen-post, to stiffen the principal rafter at about

the middle of its length, where support is of course most necessary. Just about the intersection of queen-post and principal a level strut is ordinarily introduced, and the chief difference is that in some cases this strut comes between the queens, near their top, and in others it passes over them, as at Westminster School; but either way the same object is attained. The pieces forming the spurs are generally curved, and an arch of similar curved pieces fills the space between the queens, and rises to the under side of the level strut. As if to emphasise the connection of these designs with the crane, there is usually a drop-weight or pendant beneath the inner end of the jib, whether the queen-posts are continued downwards or not. Auxiliary supports are generally contrived for the principals, but in very dissimilar ways; and although a king-post is frequent in the upper half of the roof, it is absent in perhaps an equal number of designs.

The stability of the principle is attested by the many examples that have stood the trial of long service, though at Westminster the boast has to be somewhat moderated. A good view of the capacious interior is given in Ackermann's "Public Schools," aquatinted by Stadler, after a drawing by Augustus Pugin. A poetical scholar writes:—

> Fixed to support the roof above, to brave,
> To stem the tide of Time's tempestuous wave,
> Nine stately beams their spacious arches show,
> And add a lustre to the school below.

The honour of the roof, however, is sadly compromised by the introduction of iron rods that pass

from wall to wall and from bracket to bracket—clumsy, inartistic expedients, at variance with the mechanic system of the work, and showing that the very traditions of ancient practice had passed away. The walls might have been bound and fortified, the principal rafters stiffened, decayed parts reinstated, the covering lightened, without disfigurement to an object of interest, offence to taste, or violence to truth.

In colleges, inns-of-court, trade halls, and mansions, roofs of this class abound, and they are very frequent in churches.

Variety is sometimes attained by elongating the post next the wall, and fixing the foot of the spur at a considerable height above the corbel when the lower part of the post admits of being treated as a shaft or pillar. The nave roof of Trunch Church, Norfolk, has brackets stilted in this way, and the spandrel of the bracket is filled by a perforated board in the manner of plate tracery. The space above the jib, enclosed by the principal rafter and queen-posts, is similarly filled. There is no horizontal cross-strut in this roof, but in the central part, a stilted arch rises from the ends of the jibs between the queens, and combines with the principal rafters, which latter abut at the top upon a thick wedge-shaped block like a keystone. These blocks support the moulded ridge, and over it the common rafters are framed and pinned. This is a more than ordinarily elaborate design, and as no horizontal line crosses the church between floor and ridge, the effect is eminently light and lofty.

In some instances, as at Outwell Church, the spur and wall-posts are omitted, and the jib serves as a corbel. In other cases the jib is dispensed with, and the spur brought into prominence as at Brinton Church, where, with no special attention to elegance, the utmost appearance of spaciousness is secured. At S. Mary, Pulham, (Wykeham's first benefice), the general design, the mouldings, and carved enrichments all display artistic ability and grace.

The bracket principle, though dignified under simple treatment, is very susceptible of embellishment, and was found so generally convenient and effective as to induce its very frequent employment. Advance may be perceived from the severe forms of utility to decorative construction, and thence to constructed ornament, by which fiction ultimately surmounted truth. One set of brackets was made to rise above another, as at the Inner Temple Hall, London, and Bacton Church, Norfolk. But the fullest development of this rich and complicated mode is at Knapton—a nave of the unusual width of 30 ft. Carvings of angels with wide-spread wings, flowers and ornaments are freely introduced, and colour is so boldly applied as to present a striking and florid effect rarely approached elsewhere.

Smith's mute record is full of secular examples, while Messrs. Brandon have principally resorted to parish churches. The hall of Wadham College (1613) is exquisitely rendered in Ingram's "Memorials of Oxford."

CHAPTER XIII.

CROWHURST, KENT.

In a quiet Kentish district on the deep clay lies the parish of Crowhurst, surrounded by Limpsfield, Oxted, Tandrige, and Lingfield. It contains the further manors of Grove and Chellows, and Newland, but the population is small and the houses few. It is unnoticed in Domesday, but formed a distinct manor in the early part of the fourteenth century, and was granted by John de Horne to the founder of the Gaynsford family, who was buried here in 1450 ; and whose descendants long retained the ownership. The circumstances that connect Crowhurst with royal and historic events are perfectly natural. Anne Boleyn, (or, according to her own subscription, *Anna de Boullan*,) sprang from a race of London merchants, of whom the first was buried in S. Lawrence Pountney. Geoffrey Boleyn, Lord Mayor in 1457, bought Blickling Hall, Norfolk, of Sir John Fastolf; and Hever Castle, Kent, of the Cobhams. Both these seats, and Rochford Hall, Essex, have been named as the birth-place of the Queen, but probability inclines to Blickling. The event would confer distinction on any place for "there is no name in the annals of female royalty," says her biographer, "over which the enchantments of poetry and romance have cast such bewildering spells." But

though born elsewhere, it was at Hever Castle that Henry VIII. paid her the homage of his suit, in the happy time before contending parties became detractors, leaving no faithful representation of her moral character, as Holbein has done of her personal beauty. Taking a ride of twenty miles along—

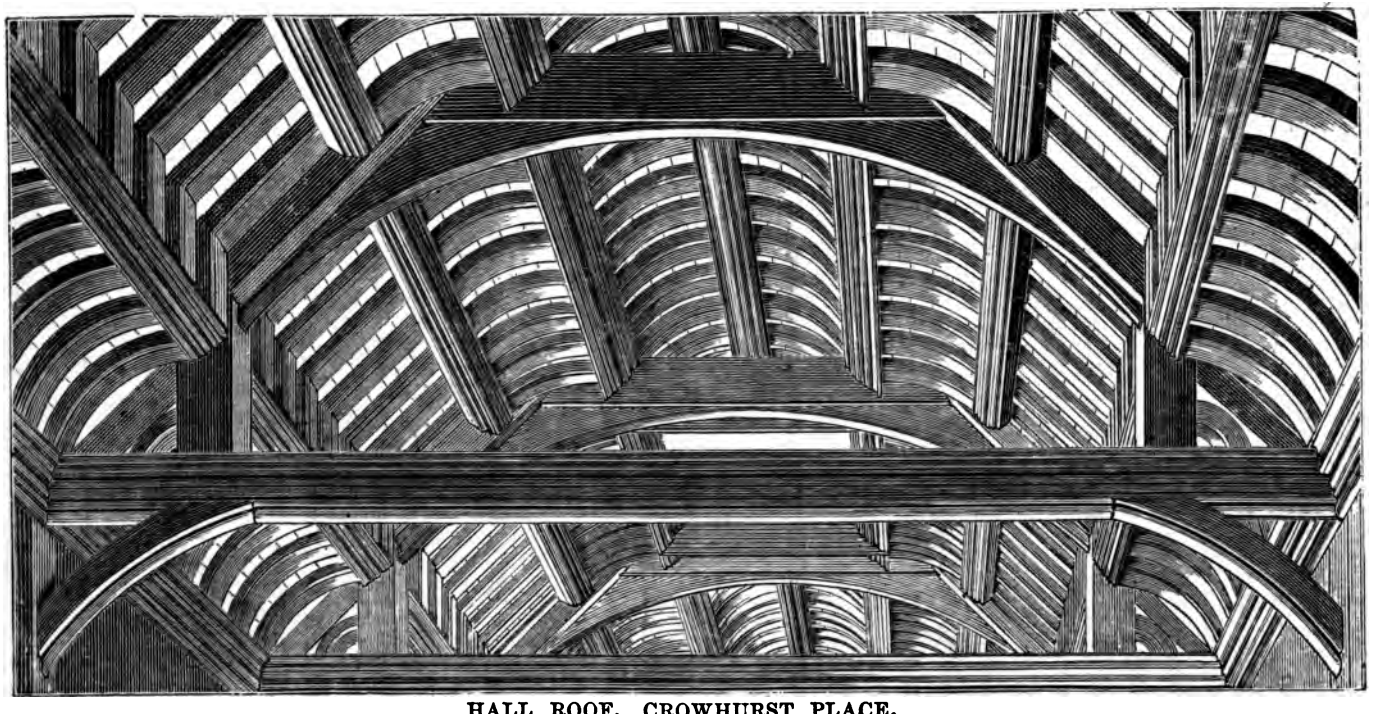
"The rose-hung lanes of woody Kent,"

the King would sound a bugle as he reached a neighbouring hill, to give notice of his approach, and the spot is fixed in local tradition. The distance from Hever to Crowhurst being about four miles, it may be assumed that their respective occupants would be on terms of neighbourly intimacy, and one incident especially supports this view. Among the ladies of Anne's retinue, was a fair young gentlewoman, Mistress Gaynsford, beloved of a noble youth, George Zouch, who snatched a book from her hands. It was a copy of Tindal's translation of the Gospels that Anne had lent her, and as it could only be recovered by the King's intervention, he had an opportunity to make an examination that is supposed to have influenced his subsequent proceedings. Crowhurst (a woodland name) lying *en route* from Eltham to Hever, it seems quite probable that the King should have been occasionally entertained here. His visits are, indeed, traditionally attested by a double hedge of yew, in the planting of which his Majesty took part. Another circumstance I may mention, though it was probably not thought of at the time, is the fact

that Sir John Gaynsford had been the husband of six wives, affording a singular prefigurement of the destiny awaiting the royal guest received with so much honour and welcome. Sir John, however, had twenty children, Henry only three.

Crowhurst Place must have presented a good example of the Mediæval mansions next in scale to the castle—viz., the moated manor house. The moat and wall, indeed, are still almost entire. The house was chiefly of timber in panels, and the roofs were covered with Horsham slates. There was a room, about 14 ft. square, handsomely fitted up, and ornamented with armorial bearings painted on small boards. A larger parlour was splendidly finished with a cornice of openwork, backed by a crimson ground. The ceiling consisted of fluted girders and joists, painted blue, and studded with stars of gilt metal. The entrance-porch has been removed, but the ironwork of the latch, especially a plate of perforated work, with a backing of red Morocco leather, indicates the careful treatment of detail. The Hall was the chief apartment, and though greatly disfigured and disguised by the conversion of the building into a farmhouse, is still the feature of principal interest. The original timber roof remains, and is so perfect and substantial as to be capable of enduring for centuries to come. When Mr. Railton was engaged with the erection of Lingfield Parsonage, it attracted his attention, and the accompanying illustration is based on the accurate particulars he obtained.

As the inclosing walls were of timber, and



HALL ROOF, CROWHURST PLACE.

incapable of resisting by mere weight the lateral thrust of a roof, while such expedients as we have seen at Nursted Court* would have curtailed the floor space to an inconvenient degree, the safest, and, perhaps, on the balance of evils, the least artistically objectionable mode was adopted—namely, the introduction of a cross girder. Under somewhat similar circumstances, in the chapel of Croydon Palace (see section at page 34), a decorative arch was formed under the girder and the upper part of the roof shut off by a ceiling, but at Crowhurst so great a sacrifice was inadmissible, and the cradle roof was determined on. Upon the wall-posts of the opposite sides is laid the strong cross girder, as something to build upon. At the greatest convenient distance from the centre, queen-posts are erected, and their pressure on the girder is relieved by curved struts reaching some way down the wall-posts. Principal rafters incline from the walls towards the centre, resting on the tops of the queens, but are only about two-thirds of the length that would reach the apex of the roof, being stopped at that point by a level strut, under which is a connecting arch. From principal to principal extend massive purlins supporting the stout rafters, which are partly straight and partly curved, a mixture that gives considerable intricacy and richness to the work, without impairing its character as a piece of open carpentry.

Imitation is the strongest proof of admiration.

* Sutton Courtenay, Berks, may be also referred to.

The grand original in Westminster Hall was repeated at Beddington and at Lambeth. Crosby Hall and Christ Church have been renewed in recent examples, and in the booking-office of the Midland Railway, St. Pancras, Mr. G. G. Scott has freely imitated some leading lines of Crowhurst. In the days of its perfection, when furnished with appointments of country state—heraldic emblazonments, stags' antlers, hunting-horns, dog couples, and instruments for the chase, besides weapons and armour of more serious import, the hall must have had a striking effect, but the habits which had called such apartments into existence were in the last stage of transition. The custom of dining in them began to decline in the fourteenth century, and was far less generally observed in the sixteenth. In ordinances of Eltham, A.D. 1526, it is stated that "sundrie noblemen and gentlemen and others doe muche delighte and use to dyne in corners and secret places, not repayring to the Kinge's chamber or hall."

The Surveyor-General of Henry VIII. notes repairs to the "Kinge's dynyng chamber and the Quenys dynyng chamber," at the manor of Greenwich. Part of the Hall was occasionally screened off for a dining room, or, its lofty proportions ceasing, a room was built above, and the upper classes at length entirely relinquished the ancient usage of dining with their retainers. Effectual State provisions for general domestic safety rendered the great hall of old times unnecessary, and its disuse closed one chief opening for artistic carpentry.

CHAPTER XIV.

HAMPTON COURT AND CHRIST-CHURCH.

IT is here proposed to look at carpentry connected with the most eminent ecclesiastic England has in any age produced, without excepting her only pope (Adrian IV., A.D. 1154-9). Far above all others in celebrity stands Thomas Wolsey of Ipswich, born 1471. Moved at a very early age from a country grammar school to Magdalene College, Oxford, he became a bachelor in that university, "the boy Bachelor" of Arts, in 1485. He soon obtained a fellowship, and was bursar of his college some years later (1498).

Oxford, a cluster of splendid edifices, was calculated to inspire a cultivated and ardent mind with the passionate admiration for architecture displayed by many Oxford men, and largely entertained by Wolsey. Magdalene itself, fresh from the munificent hand of William of Waynflete, claimed admiration even in Oxford, and was, indeed, so far immature as to afford exercise for Wolsey's attention to the elegantly-proportioned chapel tower with which his name is sometimes associated.

Among his college pupils were the sons of the Marquis of Dorset, and from that nobleman he received the benefice of Lymington, his first preferment, in the year 1500. He forthwith busied himself in repairing the church and parsonage,

but was presently made domestic chaplain to the Archbishop of Canterbury, upon whose death he went over to Sir John Nanfan, Treasurer of Calais, by whom he was commended to Henry VII., and so commenced his court life as King's chaplain, an office that was soon followed by the Deanery of Lincoln, together with the prebends of Walton-Brinhold and Stow.

He was consequently a man of established position, reputation, and wealth before Henry VIII. ascended the throne, though with the new reign his second stage of extraordinary advancement may be said to have begun. . As Canon of Windsor, Registrar and then Chancellor of the Order of the Garter ; as Prebendary and Dean of York, Dean of Hereford, and Precentor of S. Paul's, he took rapid steps, to be followed by others of greater importance after the King's return from his French campaign, when Wolsey entered upon State administration. This was in 1513, the year in which he became Bishop of Tournay. In the next he received the bishopric of Lincoln and the archbishopric of York. 1515 brought the Cardinal's hat and the Chancellorship. In 1519 his prospect of the Papacy was fair, and though in the event unsuccessful, he was by the conciliatory policy of his fortunate competitor made Legate, with powers in this country almost as large. By administering the see of Bath and Wells, holding in commendam the rich Abbey of S. Alban, and obtaining in succession the bishoprics of Durham and Winchester, besides the receipt of foreign honours and

emoluments, his wealth outgrew all safe proportions for a subject.

Learned, polished, and sumptuously arrayed, Wolsey was fitted to embellish any great court, and his natural proneness to festivity and show seemed especially suited to that of Henry VIII. But in his love for gorgeous furniture, equipage, and retinue he surpassed, and in surpassing offended, the susceptible and jealous monarch he had almost forgotten to consider a master. He was a great and liberal patron of literature, possessed a fine taste in art, and even when most encompassed by luxury was intent on the advancement of science. He was a warm admirer of architecture, and architecture, as usual, makes to him the most ample and enduring return. His plans have the reputation of elegance, and in their accomplishment he was utterly unsparing.

The strongest of all pleas in his favour is that if he appeared selfish in amassing wealth, he freely disbursed it in noble foundations that unceasingly serve the cause of knowledge and civilisation:—

> Ever witness for him,
> Those twins of learning that he raised in you
> Ipswich and Oxford! One of which fell with him,
> Unwilling to outlive the good that did it.
> The other, though unfinished, yet so famous,
> So excellent in art, and still so rising,
> That Christendom shall ever speak his virtue.
> *Henry VII.*, act iv., scene ii.

It is, however, as patent as it is lamentable that Wolsey's architectural monuments are also memo-

rials of the danger he was incurring by their display. Hampton Court was begun in 1514, before he was Cardinal, and when it is considered that much of the present plan consists of additions by later possessors it may be assumed that the style, rather than the extent of the palace, was the cause of that envy he felt it a matter of policy to appease by presenting it to the King. This was in 1526, when the shade of coming evil may have been apparent to the Cardinal. He, however, appears to have been in occupation till 1527, when he received the French ambassadors there.

During Wolsey's later years at Hampton Court he was busily engaged in the institution of Christ-Church, Oxford. Of this princely establishment Dr. Ingram says:—"Its architecture exhibits specimens of almost every age, from the Saxon times to our own. In its structure at once a cathedral and a college, it unites in itself the offices and duties peculiar to each, while as a seat of literary instruction it has earned itself a name throughout the civilised world which an abundant harvest during many centuries of men eminent in every department of Church and State could not fail to produce. As a collegiate establishment and professed nursery of learning, Christ-Church may be said to have had no fewer than three distinct foundations—namely, in the years 1525, 1532, and 1545. Although the two last of these bear the more imposing weight of a royal name, yet we ought never to forget that the merit of originating the whole, and therefore of really producing all

those beneficial effects which have since flowed from the institution, is wholly due to the vigorous mind and munificent spirit of Cardinal Wolsey."

The influence of the same intelligence was freely extended to architecture, and architecture is not faintly reflected by the more finished works in carpentry.

It is necessary to revert for a moment to the wonderful degree to which admiration was excited by the introduction of fan-groining. It was adopted everywhere, and though most highly esteemed at Cambridge, where its glorious success was first attained, the founder of Christ-Church had direct intercourse with that Sister University. Impatient of builders' delays, he commenced his educational work in lodgings, culling the sharpest wits and the most promising genius from every quarter, some being invited from Cambridge. The other Royal chapels of Westminster and Windsor having ceilings alike gorgeous with their prototype were, however, on the full tide of popularity. The ribs, and transoms, and grounds, executed in stone, were amazingly similar to frames of stiles, and rails, and panels, in wood. The pendant, though not constructively essential, was a novel and beautiful feature that seemed to create an irresistible desire of imitation. Wolsey's work in the Choir of Oxford Cathedral presents a remarkable instance of such a feeling There an instance of fan-groining is presented which, for the purpose of description, may be called too narrow for the span, and the nucleus of ribs that might have rested on a

capital or corbel next the wall, here stands out in a series of dropping pendants. To support these pendants and the central ceiling, brackets are thrown out from the walls, and transverse arches are turned over the clerestory windows. Fan-groining crowns the staircase to the Hall of Christ-Church, and it crowns the dais oriel within the hall.

The roof over the body of the hall is constructed on the bracket principle, similar to that at Westminster School, with great ornamentation, and with one especial difference. In the earlier examples that have been passed in this review, a space extending from the top of the wall to the rafter was occupied by open spars or ashlar pieces. In later instances the same space was covered by an ornamental band or fascia. We saw this band at Crosby Hall, but there, there was no bracket. At Christ-Church we see it both on the wall and superadded to the bracket, giving a considerable increase of importance to that feature. The stone corbels from which the brackets rise are not unlike those of Crosby Hall, but the upper member is of Tudor flower in lieu of battlements. From the inner end of each bracket rises a queen-post to the principal rafter, and at that intersection the first longitudinal purlin occurs, with a range of four-centred arches and pendants on each side beneath it. Arches are also thrown across from queen to queen, headed by cross struts rising somewhat in the middle. The triangle between this strut and the principal rafters is filled by tracery with a central

post, and a boss marks the apex of the arch mouldings.

The windows form an elevated range, as in some other cases, the oriel only coming to the floor; but wainscoting here covers the lower part of the walls that were elsewhere left plain for the reception of tapestry. No greater honour could well be paid to the merit of the Christ-Church roof than the adoption of its design for the new hall of the Inner Temple, London, where many of the alumni must recognise its welcome form. It would be difficult to contrive a better, and Mr. Sydney Smirke has set an admirable example of modesty and judgment in the reproduction. Mr. Wilkins obtained, perhaps, more credit for renewing the Crosby Hall roof at Cambridge than for any other contrivance of which he gave that University the advantage. The new roof at the Temple is well given in the *Graphic* newspaper for May 21, 1870, except as to the confusing lines of some diagonal boarding.

The roof at Oxford was erected under Wolsey's immediate sanction, but so much can hardly be said for that at Hampton Court. After presentation to the King, additions were made, but still it is understood upon the Cardinal's plan, and by the original architect—a court architect, it may be presumed—some painter-like artist, and not improbably Hans Holbein. The palace was in high favour with the King and court. Here Edward VI. was born, October 12, 1537, and the marriage with Catherine Parr was celebrated in 1543. The

hall was occasionally used as a theatre by Henry VIII., Elizabeth, George I., and George II. The roof ultimately became decayed, and was thoroughly and carefully repaired in 1820.

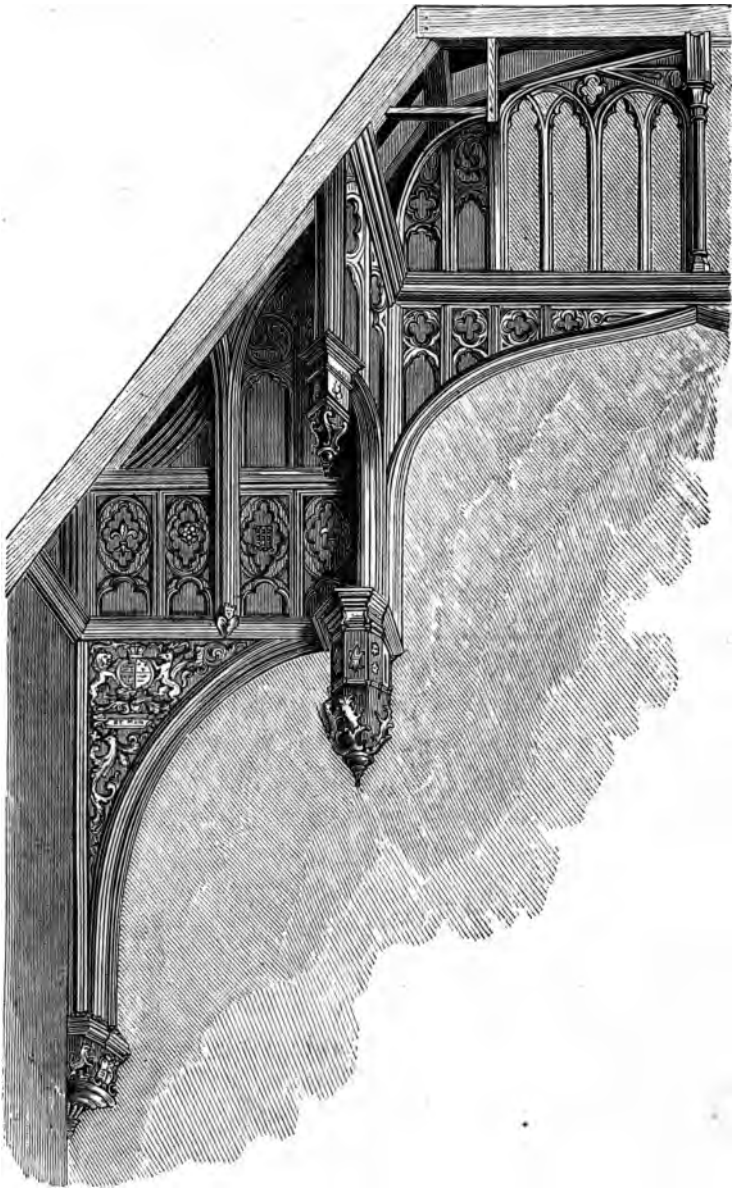
In the Oxford roof the older principle of timber framing was followed with tolerable fidelity, as was the case at Eltham; while at Hampton Court, the most complex and elaborate object of the sort we possess, there is a singular blending of open framing, like the great roof at Westminster, and the close casing of Crosby Hall.

The Hampton Court example is of fine proportion, 106 ft. by 40 ft. and this last dimension indicates the carpenter's increased ability to cover wide spans. It is a bracket roof, and the structural timbers are chiefly concealed. Commencing with the carved stone corbels, the brackets they support are moulded on the edge, and charged with royal insignia at the sides. A band of tracery surmounts the jib, and from the front starts the queen-post, dropping into elaborate pendants. Crossing between queen and queen is a level timber, supported by a stilted four-centred arch, and bearing above a plane of open mullions and tracery, finishing against the curvature of the ceiling, which is also ribbed and traceried. Then longitudinally, there is a range of arches from one queen-post to the other, of a compound trefoil character, dropping pendants at the cusps. This last range of arches is parallel to the side wall, and the length of the jib marks the separating distance. At the mid-length of the jib is another, but secondary, line of

arches, and then the casing is made to assume the approximate figure of groining. In the central part are two lines of carved pendants, and there seems, indeed, to be in all directions curves of the most graceful sweep, floating ornaments, carved emblems at once fanciful and historical, as the initials of Henry and Jane Seymour interlaced with true-love knots. Every appliance, it may be said, was resorted to for clothing this royal roof with majestic dignity, festive lightness, and all the decorative splendour of its age.

With that age the old barbaric course of feudal rule was closed, the machinery of a more enlightened government recognized, and modern principles of social welfare fixed. The change is notably recorded by public buildings, and evidenced in the altered application of timber. Wealth and Luxury have driven the carpenter into obscurity, while a host of refining artists are employed to overlay and hide his work.

But we have a splendid series of originals that ought to be preserved with no less care than pictures by Raphael or Titian. Our national pre-eminence in ancient carpentry has been too long disregarded, and works whose interest will grow with time, are constantly permitted to disappear.



HALL ROOF, HAMPTON COURT.

CONCLUSION.

A glance at the graceful forms and technic methods of old has brought into view representative productions of a grand but obsolete school that would command respect were it for age alone, and my group may thus interest the antiquary, though I presume to disclaim any intention of consulting a taste that might be gratified by remains not worth the name of Carpentry at all.—By quaint, fantastically-fashioned, nogging work—

> "A front of timber crossed antiquity
> So prop't, worm-eaten, ruinously old."

The mediæval roofs, indeed, will no more be repeated than the period to which they belong will return; but veneration on this account is the lowest claim of works that exercise the living influence of great intrinsic merit, of results to be admired, and of principles to be studied. They afford a natural and dignified introduction to the economic and exact system of modern times. A system of theory, and rule, and science, but utterly deficient in the charm and sense of art! Our patriarchal oak and chestnut, almost homogeneal with metal, have given place to fir from distant soils, displaying the characteristics of a vegetable nature in full development, and it is only by attention to these peculiarities that a correctness of application at all corresponding with the constructive rank of the substance can be ensured.

With experimental data we are but ill furnished, and the imposing fabrics of deductive reasoning

are often raised upon a narrow basement of facts. We have reached no such standard of information respecting wood as exists with regard to iron. Beams of enormous strength are made in that material, from thin plates disposed in webs, and cells, and flanges, thickness against thickness, and layer upon layer, according to the intensity and line of load. Rolled beams offer similar effects; while in castings the metal is apportioned with regard to its harder but less tenacious constitution. Compression is the dominant assailant of the one; extension, of the other. Yet the properties of either wrought or cast iron are far less opposite than those of fir. A piece of this latter, that may be divided sidewise by a single ton, because of the comparative incohesion of the cellular tissue, requires ten tons to crush it by pressure against the ends of the ligneous fibres; and when subjected to a pulling action, gives a resistance of twenty tons!

The general recognition and employment of this tensile power impart the governing distinction to modern carpentry. But although wood has cheapness and facility of working in its favour, the superior strength of iron compels its frequent use in spite of cost. The constructor should therefore possess an acquaintance with both in order to combine their powers with judgment, convenience, and effect. The steps by which this combination has been approached may, if opportunity permit, be traced in future chapters.

INDEX.

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